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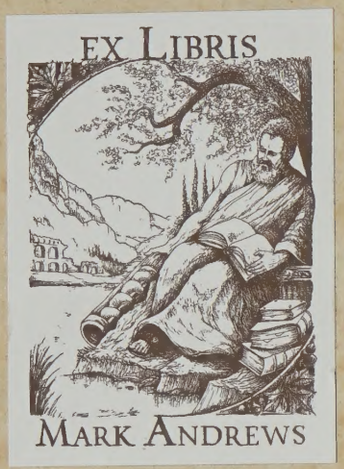

Tho. Bradley

8750

THE

ADVANCEMENT

OF

Arts, Manufactures, and Commerce;

OR,

DESCRIPTIONS

OF THE

USEFUL MACHINES AND MODELS

CONTAINED IN THE

REPOSITORY

OF

THE SOCIETY FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES, AND COMMERCE:

ILLUSTRATED BY

DESIGNS ON FIFTY-FIVE COPPER-PLATES.

TOGETHER WITH

AN ACCOUNT OF THE SEVERAL DISCOVERIES AND IMPROVEMENTS PROMOTED BY THE SOCIETY,

IN

AGRICULTURE, MANUFACTURES, MECHANICS, CHEMISTRY, AND THE POLITE ARTS;

And also in the BRITISH COLONIES in AMERICA.

BY WILLIAM BAILEY,

REGISTER TO THE SOCIETY FOR THE ENCOURAGEMENT OF ARTS, MANUFACTURES, AND COMMERCE.

Quid tandem non efficiant manus!

LONDON:

PRINTED BY WILLIAM ADLARD, PRINTER TO THE SOCIETY.

And sold by the AUTHOR; also by R. DODSLEY, Bookseller, in PALL-MALL; and G. PEARCH, Bookseller, in CHEAPSIDE.

MDCCLXXII.

1772

TO THE

KING.

SIR,

ENcouraged by Your Majesty's known Attention to the Advancement of every Useful and Polite Art, I have most humbly presumed to lay before Your Majesty the Designs and Descriptions of the Machines and Models placed in the Repository

of

of the Society inſtituted for the Encouragement of Arts, Aanufactures, and Commerce, for the Inſpection of the Public.

The Benefits already derived from the Originals, give me Reaſon to hope that the Deſigns and Deſcriptions will be a means of ſtill diffuſing theſe Benefits through the extenſive Dominions happily placed under Your Majeſty's moſt auſpicious Government: and if the Execution of a Work, neceſſarily attended with many Difficulties, ſhould fortunately merit, in any Degree, Your Majeſty's Approbation, it will ever be eſteemed the greateſt Happineſs, by

Your Majeſty's moſt Devoted

and moſt Dutiful Subject and Servant,

WILLIAM BAILEY.

THE

PREFACE.

IT was originally intended by the Society inſtituted for the Encouragement of Arts, Manufactures, and Commerce, to publiſh an hiſtorical regiſter of their tranſactions; which was prevented by ſome occurrences, needleſs here to be mentioned. Part of this deſign (not the leaſt laborious, poſſibly not the leaſt uſeful) is here attempted; and I flatter myſelf, ſo far as the induſtry of an individual may preſume on ſucceſs, that a publication of the following Deſigns and Deſcriptions of the many uſeful and ingenious Machines and Models placed in their Repoſitory, for the benefit of the public, will be a means of ſtill extending this benefit, and co-operate, in ſome meaſure, with the truly laudable views of this patriotic Society.

The

The method I have taken, in digeſting the materials of the preſent Volume, has been that of arranging the deſigns and deſcriptions of the ſeveral machines and implements, under thoſe general heads of improvement to which they reſpectively relate. Thus, Book the *firſt*, *ſecond* and *third*, relate ſolely to objects of Agriculture; the *firſt* comprehending deſigns, deſcriptions and explanations, of the ſeveral ploughs and implements of huſbandry preſerved in the repoſitory of the Society.

In the execution of the deſigns, alſo, care has been taken to repreſent not only the whole machine, but every material part of it, in ſuch various points of view, as to enable the artizan to conſtruct it from the deſcription. To this end more plates than one have been found neceſſary in the explanation of ſome machines; in which caſe ſuch plates referring to one machine, or model, are diſtinguiſhed by numbers; as Plate I. Plate II. &c. To the perſpective views, geometrical plans are alſo farther added, to facilitate the comprehenſion of the workman who would copy them in practice.

In the *ſecond* Book is given a ſhort account of ſuch of the ploughs, machines and models, in the Society's repoſitory of Agriculture, as

are

are not yet delineated; and of courſe have not their deſcriptions aſſiſted by deſigns on copper-plates.

Book the *third* contains a Liſt of the Noblemen and Gentlemen, who, for their diſtinguiſhed ſervices in promoting the views of the Society, have been preſented with honorary or pecuniary premiums, for improvements and diſcoveries in Agriculture and Huſbandry.

Book *fourth*, *fifth* and *ſixth*, comprehend the like deſigns, deſcriptions and explanations, of ſuch of the Society's machines and models, as relate to Manufactures: the *fourth* containing ſuch as are delineated on Copper-plates; the *fifth* thoſe not yet delineated; and the *ſixth* an enumeration of the premiums and bounties given by the Society, for employing the poor in pariſh workhouſes, and for improvements in various branches of manufacture, as exemplified in the Table of Contents.

Book the *ſeventh* and *eighth* treat of Mechanics, and contain deſigns and deſcriptions of various machines and engines, contrived and improved for mechanical purpoſes. Among theſe are deſcriptions of various kinds of Mills, Cranes, Weaving-Engines, Hydraulic Machines, Ventilators, with many others; together with a

particular

particular Explanation of the Apparatus uſed by the Dutch in the Turbot and Cod Fiſhery.

The remainder of the preſent Volume relates to Chemiſtry; our Colonies in America; and the Polite Arts: for the particulars of which the Reader is referred to the following Table of Contents.

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BOOK I.

OF

AGRICULTURE;

COMPREHENDING

Deſcriptions and Explanations of the ſeveral Ploughs, and Implements of Huſbandry, repreſented in the Copper-plates hereto annexed.

CHAP. I.

A Deſcription of Mr. KNOWLES's Open DRAIN-PLOUGH.

PLATE I. FIG. 1. *A perſpective View of the* PLOUGH.

A, THE Plough-ſhare, is eleven inches and an half long from the point A to the ſhoulder or fore end of its ſhank B.

B, The Shank of the Share; its extreme length from B to S is three feet two inches, and two inches broad.

C, C, The width of the Share from C to C, is twelve inches

and an half; the diſtance from the point A, to the angular points C, C, is one foot three inches and an half.

D, The Mould-board, is a compound inclined plane, and forms an acute angle at the point B (its tail end being elevated thirteen inches from the ground-reſt or baſe-line S).

E, E, E, Three Coulters, each of them three feet long, three inches broad, and three quarters of an inch thick on their back edges, inclining to the horizon thirty-four degrees. The firſt Coulter is inſerted into the Beam, four feet nine inches diſtant from the fore end, the two other Coulters are inſerted into the curved arms, two feet nine inches (inſide meaſure) diſtant from each other.

F 1ſt. The Tugg-chain, is faſtened to the ſtock of the axle-tree with a ſtrong iron ſtaple, and to the beam with a round iron bolt.

F 2d. The Bridle-chain, is faſtened with an iron ſtaple to the beam, and alſo to the top rail of the carriage-frame.

G, The Beam, is eight feet four inches long, five inches and an half broad, and four inches and an half thick; the fore part of it is rounded off taper from the firſt Coulter to its upper end, inclining to the horizon ſeventy nine degrees.

H, A flat iron Collar, driven tight on the beam, and on the fore ends of the two curved arms, to prevent them from ſplitting.

I, An iron Cramp, or Brace, which ſerves to ſteady and faſten the curved arms to the beam: the ends of this Brace being welded together, paſs through the fore ends of the arms, and are faſtened thereto with a ſcrew and nut, on the outſide of each arm, and to the beam with a round iron bolt through it, cloſe to the upper end of the middle Coulter.

K, K, Two curved Arms, three inches and an half broad, and

and three inches thick at their fore ends: their back ends are mortiſed into the ſides of the beam, and faſtened thereto with an iron bolt and a wooden trundle.

L, L, Two Nuts and Screws, with which the welded ends of the brace are faſtened to the curved arms.

M, A Wooden Trundle, one inch and an half in diameter: this Trundle paſſes through the beam and curved arms, to which it is faſtened with wooden wedges.

N, The Share Brace, is one inch broad, and three eighths of an inch thick: this Brace paſſes through the beam and ſhank of the Share, and is rivetted into the mortiſe at Number 4; its hook is faſtened to the upper ſide of the beam with an iron key or wedge.

O 1ſt. The Fore Sheat, is two feet ſix inches long, four inches and an half broad, and two inches thick, inclining to the horizon fifty degrees.

O 2d. The Hind Sheat, is two feet long, and three inches ſquare, mortiſed through the beam and ground reſt, inclining to the horizon forty degrees.

P, A wooden Trundle, two feet long, and one inch and an half in diameter: this Trundle paſſes through the beam, and is inſerted into the Handles Q, Q.

Q, Q, The Plough Handles; their extreme length from the ground reſt to their upper ends are five feet eight inches, and are diſtant from point to point two feet one inch.

N. B. Some people are of opinion that the handles would be better if they were ſixteen or eighteen inches longer.

R, R,

R, R, Two wooden Wedges, which ſerve to ſet the mould boards to a proper projection.

S, The Ground-Reſt, is three feet five inches and an half long; its width at the fore end is ten inches and an half; at the tail end nine inches, and four inches thick.

T, An iron Bolt, eleven inches long and three quarters of an inch diameter: this Bolt paſſes through the back ends of the curved arms and the beam, to which it is faſtened with a ſcrew and nut at one end of the Bolt.

a, The Axle-tree of the carriage; its extreme length is two feet ſix inches, ſeven inches broad (including the under rail of the carriage frame), and three inches and an half thick.

b, The under Rail of the carriage frame, is faſtened to the ſtock of the axle tree with wood-ſcrews or nails.

c, c, The Carriage Wheels, are two feet three inches in diameter, and one inch and an half broad on the periphery.

d, A ſmall Chain faſtened to the middle rail; at the ends of this Chain are two iron pins, which ſerve to ſuſtain the moveable rail and beam.

e, The moveable Rail, which ſupports the fore end of the beam, and ſerves to regulate the depth of the furrow by moving occaſionally the two iron pins before-mentioned.

f, f, Two Stiles, mortiſed through the ſtock of the axle-tree and the upper rail of the carriage frame: theſe ſtiles are two feet four inches long, four inches broad, and one inch thick, with holes pierced through them at proper diſtances, to raiſe or depreſs the moveable rail.

g, The

g, The upper Rail of the carriage frame, to which the bridle chain F is faſtened with an iron ſtaple.

FIGURE II.

A Geometrical Plan of the PLOUGH-SHARE.

The Plough Share is four feet one inch and an half long from A to S, and twelve inches and an half broad from C to C; its thickneſs on the creſt is one inch, gradually diminiſhing towards the edges, where it is only three-eighths of an inch thick: the length of its ſhank, from B to S, is three feet two inches; its breadth two inches.

The three Coulters E, E, E, are driven tight into the ſquare holes 1, 2, 3, on the ſhare, to which they are rivetted on its under ſide: the upper end of the fore Coulter is inſerted into the beam, and faſtened with wedges as uſual in other ploughs: the two hind Coulters are alſo rivetted to the ſhare as before mentioned; their upper ends are inſerted into the curved arms K, K, and faſtened thereto with iron wedges. See Fig. 1ſt.

The under end of the Share Brace N, is driven in tight, and rivetted in the ſquare hole, Number 4; its upper end paſſes through the beam, and is faſtened thereto with a feathered bolt or iron wedge, as repreſented in Fig. 1ſt.

The Shank of the Share is let in even with the under ſurface of the ground-reſt, and faſtened thereto with ſtrong flat-headed wood-ſcrews.

This

This Plough was tried with ſeveral others on *Wimbledon Common*, on *May* 12, 1767, in preſence of the Committee of Agriculture, and many others; who were of opinion that it was preferable to the other Drain-Ploughs, as it is more ſimple in its conſtruction, and performed its work more effectually. The Committee was therefore of opinion that Mr. KNOWLES (the inventor) was deſerving the whole premium of 50 l. to which the Society agreed *May* 20, 1767.

N. B. This Plough was firſt drawn by ſix horſes, but as the ground was a little ſtony at the bottom, it was found neceſſary to add two horſes more, with which a compleat ditch or drain was made, one hundred and fifty yards long, in three minutes: the drain was thirteen inches deep, twenty inches broad at the top, and ten inches broad at bottom.

CHAP. II.

A Deſcription of Mr. MAKINS's Covered DRAIN-PLOUGH.

FIG. 1. *A perſpective View of the* PLOUGH.

A, THE Beam; its extreme length is ſeven feet, four inches; its breadth, at the fore-ſhare brace, is eight inches; and three inches and three quarters thick: the fore end of the beam is arched, and pierced through with ſmall holes to receive an iron pin; by which pin the bridle and its tugg-chain, &c.

are

are elevated or depreſſed, and ſet to the propereſt degree of elevation for drawing to the beſt advantage, and regulating the depth of the furrow; alſo for lifting the point of the ſhare out of the ground when the Plough is not immediately in uſe, and requires to be moved from one place to another.

B, The Sheat, is three feet long (including its tenon) eight inches broad, and two inches and an half thick, inclining to the horizon fifty degrees.

C, An iron Directing Plate, faſtened to the beam with a flat-headed iron bolt, and feathered key, or wedge; and to the ſhank of the ſhare, with an iron rivet or ſcrew, inclining to the horizon fifty degrees. In the middle of this plate there is a long mortiſe or aperture, which ſerves to direct and ſteady the fore end of the moveable mould board.

D, A concave iron Breaſt Plate, whoſe upper end is faſtened to the beam, with a flat-headed iron bolt and feathered key; its under end is welded to the ſhare, gradually diminiſhing towards its point: the Breaſt Plate is ſet to an angle of fifty degrees, and fixed in an oblique direction, the better to throw off the mould as it ariſes thereon.

E, A round iron Bolt, three quarters of an inch diameter, which paſſes obliquely through the beam, and the under end of the ſheat; its uſe is to ſtrengthen and ſteady the ſheat.

F, A flat iron Brace; its under end is rivetted to a thin iron plate at the back ſide of the ſpring-board, its upper end to the left ſide of the beam, and faſtened thereto with a round iron bolt and ſcrew; this Brace ſerves to direct and ſteady the

fore

fore end of the moveable mould-board at the left ſide of the Plough. See Fig. 2.

G, A flat iron Brace, whoſe under end is let in, and rivetted to the ſhank of the ſhare; and its upper end is faſtened to the beam with a round-headed bolt, in the ſame manner as the iron brace E.

H, The Coulter, is three feet four inches long from the point to its upper end, one foot eight inches long in the blade, and one foot eight inches in the ſhank; the extreme breadth of the blade is two inches and an half; the ſhank is one inch and one quarter broad, and ſeven-eighths of an inch thick, inclining to the horizon ſeventy-five degrees; and faſtened to the beam with wedges in the uſual manner.

I, The iron Brace, or Stay, is one foot three inches long, and half an inch diameter: this Brace is hooked through the blade of the ſhare, and paſſes through the beam, to which it is faſtened with an iron key through a mortiſe or aperture in the upper end of the Brace.

K, An iron Bridle, or Tugg-Frame, faſtened to the fore end of the beam, with a round iron bolt, which ſerves alſo as an axis for the bridle to turn on: the length of its arms from the bolt to its collar is one foot ſeven inches, their breadth one inch and an half, and three quarters of an inch thick.

L, A round iron Staple, driven into the ſide of the beam, to which is faſtened a chain, with an iron pin, fitted to the holes in the arched head of the beam; and is uſed to fix the bridle to a proper degree of elevation for the purpoſe required.

M,

M, The Plough-Share; from the mouth of its ſocket to its cutting point, is one foot four inches long, its breadth and thickneſs two inches ſquare, gradually diminiſhing towards its point, where it is one inch and an half broad, and one-eighth of an inch thick, including the breaſt-plate, or convex fence iron D, welded thereto.

N, A curved Iron Plate, or Sheath, two feet ten inches long, eight inches and three quarters broad at the upper end, and four inches and three-quarters at the under end: this Plate or Sheath is bent in ſuch a manner as to embrace and fit the moveable mould-board in all the different degrees of its elevation: its uſe is to receive and direct the earth as it riſes towards the mould-board, and prevent it from falling back into the drain, or on the under part of the fixed mould-board; the under end of the Sheath is looſely fixed with an iron pin rivetted to the ſhare; in the upper-end, there is a ſmall hole which matches with the rank of holes in the moveable mould-board; and when the plough makes the firſt cut, the Sheath is faſtened thereto with the round flat-headed bolt Q, which, paſſing through the hole, No. 1, in the rank of holes, is faſtened thereto with the pin R; when the plough is to make additional cuts, the bolt and pin are to be taken out, and the moveable mould-board ſhifted and fixed to the ſecond hole, and ſo on to the third, &c. according to the different cuts it is to make.

O, An Iron Pin (in ſhape ſomewhat like the letter T). This pin bears on the directing Plate C, and moves eaſily up and down in the aperture, or long mortiſe; when the moveable mould-board is ſhifted from one degree to another, the pin is faſtened to the under end of the mould-board with the ſcrew and nut P.

P, The Screw and Nut of the double armed Pin, is faſtened to the fore end of the moveable mould-board as before-mentioned.

Q, A round flat headed Bolt, with which the curved iron, or ſheath, is faſtened to the mould-board.

R, An Iron Pin, driven into a mortiſe in the end of the bolt Q, to prevent the bolt from getting looſe.

S, An Iron Bolt, behind the fixed mould-board X, with which the two upper mould-boards are faſtened together with a feathered key.

T, T, Two Chains, with which the bolts R and S are hung to the beam.

V, The moveable Mould-board, at the right ſide of the plough is three feet four inches long, eight inches broad, and one inch and three-quarters thick at its tail end.

U, The Ground-reſt, is two feet ſix inches and an half long, two inches and an half broad, and half an inch thick.

W, The under Mould-board, is faſtened to the ſheat and handle.

X, The upper fixed Mould-board, is three feet ſix inches long, and eight inches broad at the tail end, projecting ten inches from the beam, where it is one inch and three-quarters thick.

Y, Y, The Handles, four feet eleven inches long, and three inches ſquare at their under ends, gradually diminiſhing towards their upper ends, where they are one inch and a quarter diameter.

Z, An Iron Hook, to which the wheel carriage is connected, with a ſtrong chain faſtened to the middle of the axle-tree of the carriage wheels.

FIG.

FIGURE II.

A, The Beam.
B, The Sheat.
E, The Iron Bolt.
F, The flat Iron Brace.
G, A flat Iron Brace rivetted to the ſhare.
H, The Coulter.
I, A round Iron Brace faſtened to the beam and the coulter.
K, The Bridle or Tugg-iron.
M, The Plough-ſhare.
U, The Ground-reſt.
X, The upper fixed Mould-board.
Y, The Handle of the Plough.
Z, The Ring and Hook of the Bridle.
a, A moveable Mould-board, which ſerves to throw off any caſual mould that may fall into the near ſide of the drain: at one end of this Mould-board there is an iron plate let in even with the ſurface of the board, and faſtened thereto with flat headed wood-ſcrews; the fore end of the plate is bent or doubled ſo as to make a flat hook, which occaſionally ſlides up and down the perpendicular iron brace F, and ſerves to guide and ſteady the fore end of this Mould-board, when it is ſet to the height required; the tail end is faſtened with a wooden pin or trundle through the Mould-board and ſheat. See a, b, Fig. 1, 2, and 3.
b, An Iron Hook or Plate, faſtened to the moveable mould-board.

FIG.

FIGURE III.

The moveable Mould-board, with its wooden trundle a, and flat iron hook b, faſtened to the left ſide of the plough.

This view of the Mould-board is taken from its upper edge, in order to ſhew the flat iron hook and the wooden trundle faſtened thereto.

FIGURE IV.

A view of the iron directing plate C, in which there is a long mortiſe or aperture for the double armed pin O, to ſlide up and down in, when the moveable mould-board V is ſet from one degree to the other.

This Plough was worked in a piece of ground belonging to —— *Pearce*, Eſq; at *Upton* in *Eſſex*, in preſence of the Committee of Agriculture, *March* 30, 1770.

The Plough was drawn by ſix horſes, two a-breaſt, and made two parallel drains, one of them three hundred and forty, the other three hundred and twenty feet, in all ſix hundred and ſixty feet long, ſeventeen inches deep, five inches wide at top, and two inches and an half at bottom. The Plough went ſix times through the trenches to bring them to the depth before-mentioned, and performed it in thirty-four minutes, and twelve ſeconds. The length of the turn at each end was about twenty yards, and is included in the time above-mentioned.

The

The Committee was of opinion that Mr. *Makins* was deſerving of a bounty of fifty guineas for the invention of his Drain Plough.

To which reſolution the Society agreed *April* 11, 1770.

CHAP. III.

A Deſcription of Mr. GEE's PLOUGH *with Six Shares and Coulters.*

A, THE Bridle or Tug-iron, to which the ſwingle-tree is faſtened; the ſhanks of the Bridle paſs through the bed of the fore carriage G, and are faſtened thereto with two iron keys or wedges, as repreſented in Fig. 4. Plate 1.

B, B, B, Three Carriage Wheels; the fore wheel is nine inches diameter, and the hind wheels are two feet three inches diameter, and ſix inches broad on the periphery; the fore wheel with its bed and cheeks are connected to the plough-frame with the perpendicular iron bolt U, which is the center of its horizontal motion when the Plough turns to the right or left.

C, C,

C, C, C, C, C, C, Six Shares (three only are ſeen in this view of the plough) their lengths are one foot three inches, including their ſhanks, their near edges are turned down at right angles with the horizon, from the point of their Shares to the end of their ſhanks; by this return of the edge of the Share, a rib or fillet of iron is formed one inch and an half broad to the near ſide of the Share; theſe ribs are the ground-reſts, to which the ſheats and coulters are dove-tailed and faſtened with wood-ſcrews, as repreſented in Fig. 2. Plate 1.

D, D, D D, D, D, Six Coulters, two feet nine inches long, two inches broad, and an inch thick, inclining to the horizon about thirty-nine degrees; their under ends are dove-tailed and ſcrewed to the ribs of the ſhares, as before-mentioned. The upper ends of the Coulters and ſheats paſs through the curved rails of the plough frame, and are faſtened thereto with the wedges V, V, V, as repreſented in Fig. 1 and 2. By this method of faſtening the Coulters, they are leſs liable to vibrate or be out of order than common Coulters, and the ſhare is fixed much better than with a ſhare brace and hook: theſe Coulters are made different from the common Coulters, whoſe backs or curved edges are about an inch thick, gradually diminiſhing towards their cutting edges, by which ſhape they enter into the ground like wedges, as they really are; and if this plough was made with ſuch wedge-like Coulters, it would require a much greater force to work it; which has been proved by repeated experiments made with a model of the plough, on a bed of ſtiff clay properly prepared for that purpoſe. Theſe new-conſtructed Coulters (contrary to other Coulters) are one inch thick before, gradually diminiſhing towards their back edges, where

where they are but one tenth of an inch thick, and bevelled off to an obtuſe angle before, (ſee Fig. 9.) where the Coulter is repreſented broken or cut aſunder, the better to ſhew its angular form, which is found to enter into the ground more freely and with leſs obſtruction, by the adheſion of the mould againſt its ſides, than Coulters made the uſual way.

E, E, E, E, E, E, The Six Sheats, to which the mould-boards are faſtened, are two feet nine inches long, four inches and an half broad, and two inches thick, inclining to the horizon about thirty-nine degrees: theſe Sheats are faſtened to the rib, or ground-reſt, and plough frame, in the ſame manner as the coulters are. At the upper ends of the Sheats and Coulters there are indexes to direct how to regulate the depth of the furrow, and alſo to make the ridge more round or flat.

F, F, F, F, F, F, The Mould-boards; their extreme lengths are one foot three inches, and their breadths at their tail ends ten inches.

G, The Stock, or curved Bed of the fore Carriage, is two feet four inches and an half long, nine inches broad, and two inches and an half thick.

H, A curved Tranſom, is nearly of the ſame ſhape as the bed G, which is three feet one inch and an half long, one foot ſix inches broad, and five inches thick, to which the fore ends of the curved rails I, I, are halved, and faſtened with wood-ſcrews.

I, I, The Rails of the Plough-frame, are ſeven feet long (excluſive of their halvings or tenons) eight inches broad, and four inches and an half thick.

K, The upper Beam, is ſeven feet three inches long (excluſive of its tenons) four inches and three-quarters broad, and two

inches

inches and an half thick; its fore end is mortiſed into the curved tranſom H, and its other end into the hind tranſom R.

L, A Tongue, or flat Piece of Iron, eleven inches long, two inches broad, and one eighth and a ſixteenth of an inch thick; its under end is faſtened to the beam K, and its upper end paſſes looſely through an aperture in the end of the curved lever N, to which it is alſo faſtened with a round iron pin. The plough-frame and lever being thus connected, the ſhares, coulters, &c. are occaſionally lifted up, when the plough is to turn about or be removed from one place to another.

M, M, Two Standards, or Pieces of Wood, one foot nine inches long; their under ends ten inches, and their upper ends five inches broad, and one quarter of an inch thick; theſe ſtandards are halved into the under beam T, and faſtened thereto with wood-ſcrews; their upper ends embrace the fore end of the curved lever N; through the heads of the ſtandards and lever is inſerted a round iron pin, which is its fulcrum or center of motion.

N, A curved Lever, eight feet long, five inches broad and three inches thick at its fore end, gradually diminiſhing towards its other end; this Lever being connected to the under beam T, ſerves to take the plough up and down when it is to be turned about or removed from one place to another, as before-mentioned.

O, An Iron Hook, or Half Staple, which ſerves to keep down the end of the lever when the ſhares and coulters are lifted up from the ground.

P, P, Two Slips, or Pieces of Wood, two feet one inch long,

long, three inches broad, and one inch and a quarter thick: the under ends of theſe Slips are mortiſed into the axle-tree of the hind wheels, to which they are faſtened with wooden pins; their upper ends paſs looſely through two apertures in the hind tranſum of the carriage-frame, projecting ten inches above it: the indexes on the face of theſe Slips correſpond with the indexes on the ſheat and coulters, and are uſed for the ſame purpoſe, namely, to regulate the depth of the furrow, by elevating or depreſſing the carriage-wheels, ſheats, ſhares, and coulters.

Q, Q, Two flat-headed Iron Screws and Nuts, whoſe length from their ſhoulders to their under ends, are one foot five inches, and from their ſhoulders to the top of their heads, ſeven inches: the nuts of theſe Screws are inſerted into the axle tree S, and the ſtem of the Screws are tapt only two-thirds of their length from their points to their ſhoulders; the upper part being quite ſmooth, turn in the tranſom either to the right or left, without moving up or down, being confined thereto by the heads of the Screws above, and by the collet, and keys X, X, through the ſtem of the Screws below, as repreſented in Fig. 6. The Screws being thus confined, the upper carriage-frame is occaſionally ſet to a greater or leſs diſtance from the wheels, by turning the heads of the Screws, whoſe nuts are inſerted in the axle-tree. See Fig. 6.

R, The hind Tranſum, is three feet ſix inches long, (excluſive of its halvings to the curved rails I, I,) ſix inches broad, and two inches and an half thick.

S, The Axle-tree, is four feet ſix inches long, from ſhoulder to ſhoulder, ſix inches broad, and two inches and an half thick.

T, The Carriage-beam, is eight feet long, five inches broad, and two inches and an half thick; its fore end is ſeen in the front of the curved tranſom H, faſtened to the bed of the fore carriage G; the other end is mortiſed into the axle tree of the hind carriage, as repreſented at T, S, where the curved rail is broken, or laid open, as in Fig. 1, to ſhew this Beam, and the axle-tree S.

U, An Iron Rod, one foot four inches long, and one inch diameter; this rod paſſes looſely through the curved bed, the end of the beam T, and tranſom H; its under end has a round flat head, to prevent it from riſing up through the bed, and its upper end has a ſcrew and nut, to prevent the plough-frame from riſing too high, when the ſhares, &c. are lifted up out of the ground.

V, V, Wooden Wedges, with which the coulters, ſheats, &c. are ſet and faſtened to the plough-frame.

W, W, Two Wooden Cheeks, eight inches and an half long, (excluſive of their tenons) ſix inches broad, and three inches thick: theſe Cheeks are mortiſed into the bed of the carriage, and are the conductors of the fore wheel. See Fig. 6.

FIG.

FIGURE II.

A perſpective View of one of the SHARES, COULTERS, *&c.*

C, The Share.
D, The Coulter.
E, The Sheat.
F, The Mould-board.

PLATE II. FIGURE III.

A Geometrical Plan of the PLOUGH.

A, The Bridle, or Tugg Iron.
B, B, The hind Wheels.
C, C, C, C, C, C, The Plough Shares.
D, D, D, D, D, D, The Coulters.
E, E, E, E, E, E, The Sheats.
F, F, F, F, F, F, The Mould-boards.
H, The curved Tranſom.
I, I, The curved Rails.
K, The Fixed Beam, mortiſed into the two tranſoms.
L, A flat Piece of Iron, connected to the curved handle N, and the carriage beam T.
M, M, Two Pieces of Wood, faſtened to the carriage-beam, and is uſed as a fulcrum for the curved handle.
N, The curved Lever.

O, The

O, The Hook which keeps down the curved Lever.

P, P, Two Slips of Wood faſtened to the axle-tree of the hind carriage.

Q, Q, Two Iron Bolts, with ſcrews and nuts, with which the carriage-wheels, &c. are ſet to the height required.

R, The hind Tranſum, to which the ends of the curved rails are faſtened with ſtrong wood-ſcrews, &c. See R, Fig. 6.

FIGURE IV.

A Geometrical Elevation of the PLOUGH.

A, The Bridle.

B, The fore Carriage Wheel.

C, C, C, C, C, C, The Plough-ſhares.

D, D, D, D, D, D, The Coulters.

E, E, E, E, E, E, The Sheats.

F, F, F, F, F, F, The Mould-boards.

G, The Stock of the fore Carriage.

H, The curved Tranſom.

I, One of the curved Rails.

V, V, V, V, V, V, The Wedges with which the ſheats and coulters are faſtened to the curved rails, and ſet to the height required.

L, One of the Slips of Wood with which the curved handle is connected to the carriage-beam.

M, The fulcrum of the curved Lever.

N, The

N, The curved Lever.

P, One of the Slips of Wood, on which there is an index for ſetting the carriage-wheels, &c. to the height required.

Q, One of the Iron Bolts with which the wheels, &c. are ſcrewed up and down.

W, One of the Cheeks, which contain the fore wheel.

FIGURE V.

A perſpective View of one of the SHARES, COULTERS, SHEATS, *and* MOULD-BOARDS.

C, The Share.

D, The Coulter.

E, The Sheat.

F, The Mould-board.

FIGURE VI.

A Geometrical Elevation of the HIND CARRIAGE, *&c.*

B, B, The Carriage Wheels.

I, I, The Ends of the curved Rails.

O, The Hook that keeps down the lever.

P, P, The Index Slips.

Q, Q, The Iron Bolts, Screws and Nuts.

R, The

R, The hind Tranſom.
S, The Axle-tree.
X, X, The Collets and Keys.

FIGURE VII.

A perſpective View of the FORE CARRIAGE, *&c.*

A, The Bridle, or Tugg-iron.
B, The fore Carriage Wheel.
G, The Stock, or curved Bed.
U, The Iron Rod, with its nut.
W, W, The Cheeks which contain the fore carriage-wheel.

FIGURE VIII.

A, The Bridle Iron, with its ſhanks and keys.

FIGURE IX.

D, A Repreſentation of the Angular Form of the Coulter.

FIGURE X.

A Section of the curved Lever N, Standards M, M, Tongue L, upper End and under Beam K, S.

This

This plough has been ſucceſsfully uſed upwards of ſix years by the inventor, Mr. *Gee*, of *Langdon*, near *Litchfield*, who brought a model and deſcription of it to *London*, in order to ſend it to a friend of his in *North America*, but before it was put on ſhip-board, Mr. *Gee* was ſo obliging as to lay it before the Society, permitting them to take a copy of his letter, and a model of the plough, which by order of the Society was executed by Mr. *William Bailey*, and depoſited in the Society's Repoſitory of Agriculture, for the benefit of the public; for which Mr. *Gee* had the thanks of the Society, *May* 21, 1767.

CHAP. IV.

A Deſcription of Mr. DUCKET's Three Furrow PLOUGH.

FIG. 1. *A perſpective View of the* PLOUGH.

A, THE Beam, is eight feet three inches long, from the fore end of the beam to the ſhoulder of the tenon inſerted into the left handle; its thickneſs at the tail end is four inches and an half, and two inches and a quarter at the fore end.

B, The

B, The left Handle, is ſix feet and two inches long, four inches broad, and two inches and an half thick at the bottom, tapering towards the point, or upper end, where it is one inch diameter.

C, The right Handle, is ſix feet and two inches long, and of the ſame breadth and thickneſs as the handle B: theſe handles are four inches diſtance from each other at the bottom, and two feet ſix inches at their upper ends.

D, D, D, Three Trundles; two of them are inſerted into the handles above the beam; and the other at the bottom, ſix inches diſtant from their under ends.

E, A Wedge-like Piece of Wood, faſtened to the right handle, to give the mould-board a proper projection.

F, The Mould-board, is two feet four inches long, ten inches and an half broad, and three quarters of an inch thick. The back end of the Mould-board is fixed to the right handle, and the fore end to the hind ſheat.

G, An Iron Plate, two feet four inches long, and five inches and an half broad. This Plate and the mould-board are faſtened to the right handle, and another Plate of the ſame dimenſions is faſtened to the left handle and hind ſheat O: the fore ends of thoſe plates meet in a point, and are rivetted together behind the ſhare brace and hook: the ground-reſt of the firſt plough is ſeventeen inches long, two inches broad, and three eighths of an inch thick; the back end is faſtened to the right handle, and its fore end to the iron ſtaple M, on the ſhank of the ſhare. See Fig. 2.

I, I, I, The Bolts and Wedges, with which the ground-reſts and ſhanks of the ſhares are faſtened to the handles.

K, The Share, is fourteen inches long, from its point to the ſhoulder, ſix inches and a quarter broad, and a quarter of an inch thick.

L, The Shank of the Share of the hind Plough, is ſixteen inches long, two and a quarter broad, and half an inch thick: this ſhank is faſtened to the left handle, with one of the iron bolts and wedges I, I. See Fig. 2.

M, An Iron Staple, welded to the ſhank of the ſhare. See Fig. 2.

N, N, N, The Share Braces, are one foot two inches long, one inch and a quarter broad, and a quarter of an inch thick: the ſhare-hooks are one foot long, and three eighths of an inch diameter; the ſcrew part of the hind hook paſſes through the beam, ſixteen inches diſtant from the ſhoulder of the tenon of the beam, inclining to the horizon forty degrees.

O, The Sheat of the hind Plough, is nineteen inches long, three inches and an half broad, and two inches thick; this Sheat is inſerted into the beam ten inches from the ſhoulder of the before-mentioned tenon, inclining to the horizon forty degrees.

P, The Coulter of the hind Plough, is two feet nine inches long; this Coulter paſſes through the beam twenty-one inches diſtant from the ſhoulder of the beam; its angle of inclination is forty-five degrees.

Q, The hind Sheat of the Second Plough, is of the ſame dimenſions as the ſheat of the hind plough; its diſtance from

the ſhoulder of the tenon is two feet ſeven inches, inclining to the horizon fifty degrees.

R, The fore Sheat of the Second Plough, is of the ſame dimenſions and inclination as the former; its diſtance from the ſhoulder of the tenon, or beam, is three feet two inches and an half.

S, S, The two Sheats of the fore Plough, are two feet one inch long, and of the ſame width and thickneſs as the other Sheats; the hind Sheat is inſerted through the beam, four feet eight inches diſtant from the ſhoulder, inclining to the horizon about forty degrees. Theſe Sheats are fixed to a proper height by two iron wedges driven into the upper ſide of the beam, as repreſented on the upper ſide of the Sheats.

T, T, Two Iron Plates, fitted to the two oppoſite ſides of the beam, and rivetted to each other with iron pins through the beam.

V, V, V, Three Iron Plates, nailed to the upper and under ſide of the beam, to prevent it from ſplitting, or gulling.

W, A Gauge Wheel, nine inches diameter, and one inch and a quarter thick, with an iron ſtaple and wedge to regulate the depth of the furrow, &c.

The PLOUGH-CARRIAGE.

a, The Axle-tree, is thirteen inches and an half long, inſide meaſure, from nave to nave, ſeven inches broad, and three inches and an half thick.

b, b,

b, b, Two Stiles, mortiſed into the upper ſide of the axle-tree; theſe Stiles are two feet long, three inches broad, and three quarters of an inch thick.

c, A flat curved Rail, eighteen inches long, five inches broad in the middle, and one inch and an half thick, with a mortiſe at each end of it, and a thin plate-iron acroſs its middle ſurface; the upper ends of the ſtiles b, b, project about two inches above the rail, and are faſtened thereto with wooden pins.

d, An Iron Rod, or Bolt, two feet ſeven inches long, and one inch in diameter; this Rod paſſes through a hole in the middle of the curved rail and iron plate, and alſo through the beam and iron ſtaple in the axle-tree.

e, A moveable Iron Plate, ſupported by two iron pins, which are occaſionally moved from one hole to the other, to riſe or depreſs the beam; this plate is eleven inches and an half long, three inches broad, and a quarter of an inch thick; at each end of the plate there is an aperture, which embraces the two ſtiles b, b. The two pins are faſtened to the Iron Plate, with a ſmall chain, and ſerve to ſupport the beam, and regulate the depth of the furrow, as before-mentioned.

f, The Tugg-chain: one end of this chain is linked over the hind ſheat of the fore plough, and the other is faſtened to a round ſtaple driven through the end of the axle-tree.

g, The Bridle, or Notched Iron Tugg-frame, thirteen inches long, one inch and an half broad, and a quarter of an inch thick; the arms of the bridle paſs through the axle-tree, and are faſtened thereto with two iron pins.

h, h, h, h,

h, h, h, h, Four Wooden Waſhers, or round Pieces of Wood, four inches diameter, and three quarters of an inch thick: theſe Waſhers are fitted looſely on the ends of the axis, and ſerve to ſet the wheels wider or cloſer together, by adding more, or taking off the Waſhers at will.

i, i, Two Semi-circular, or hollow Wedges, with which the iron rod d is fixed to the beam, and properly ſet to throw the plough more or leſs into the land.

k, The Wheel at the right ſide of the carriage, is twenty inches diameter, and one inch and a quarter on its periphery.

l, The Wheel at the left ſide of the carriage, is eighteen inches in diameter.

m, m, Two Iron Rings, three inches and an half diameter: theſe rings are occaſionally ſhifted from one notch of the bridle to the other.

n, A Chain, which ſerves to keep the carriage at right angles, with the points of the ſhares and coulters: one end of this chain is linked to an iron hook, and faſtened with a ſcrew and nut to the beam; the other end to a hook, faſtened in the ſame manner to the end of the axle-tree.

FIGURE II.

A Geometrical Plan of the SHARE.

H, The Ground-reſt. See the deſcription of Fig. 1.

I, The Bolts and Wedges.

K, The

K, The Plough-ſhare.

L, The Shank of the Share.

M, A Staple, welded to the ſhank of the ſhare.

The Society gave Mr. *Ducket* a bounty of 50 l. for this and his Trenching Plough, *December* 23, 1767.

CHAP. V.

A Deſcription of Mr. DUCKET'S TRENCHING-PLOUGH.

FIG. 1. *A perſpective View of the* PLOUGH.

A, THE Beam, is ſix feet eleven inches long, five inches and an half broad, and three inches and an half thick at the tail end; the upper and under ſides of the Beam are plated with iron from one coulter to the other.

B, The hind Sheat, is twenty-three inches long, five inches broad, and one inch and an half thick; its upper end is inſerted into the beam, ten inches from the ſhoulder of its tenon, inclining to the horizon fifty degrees.

C, The Share-brace and Hook, with its nut and ſcrew.

D, An

D, An Iron Bolt, or Brace, to ſteady the hind ſheat.

E, The hind Coulter, is three feet long, three inches broad, and three quarters of an inch thick on the back edge, inclining to the horizon forty-eight degrees; its back edge is two feet three inches from the ſhoulder of the tenon, inſerted into the left handle of the plough.

F, The hind Sheat of the fore Plough: its back edge is three feet two inches from the aforeſaid tenon; its extreme length is two feet, breadth three inches and three-eighths, and one inch and a quarter thick, inclining to the horizon thirty degrees.

F 2d, The fore Sheat of the upper Plough: its dimenſions and angle of inclination are the ſame as the hind Sheat of this Plough: the interval between the two Sheats is three inches and an half; the two wedges at the upper ends of thoſe Sheats ſerve to ſet this Plough higher or lower at will.

G, The Share-brace and Hook, with its iron ſcrew and nut, is one inch and three quarters broad, and three-eighths of an inch thick; the hook is half an inch in diameter.

H, The fore Coulter, is two feet ſeven inches long, three inches broad, and three-fourths of an inch thick on the back edge, inclining to the horizon thirty-eight degrees.

I, I, The Plough-ſhares: their dimenſions are ſet forth in the deſcription I, I, Fig. 2. and 3.

K, K, The Iron Ground-reſts: their dimenſions, &c. are ſet forth in Fig. 2. and 3.

L, L, The Bolts and Wedges, with which the ground-reſts and the ſhanks of the ſhares are faſtened to the Plough. See Fig. 1. and 2.

M 1ſt,

M 1ſt, A thin Iron Plate, twenty inches long, and five inches broad: this plate is faſtened to the mould-board of the fore plough.

N, The Mould-board of the hind Plough, is three feet five inches long, thirteen inches broad, and one inch thick, projecting nineteen inches and three-quarters, outſide meaſure, from the left handle R, and faſtened to the handle Q, and ſheat B.

O, A Wooden Wedge, faſtened to the handle Q, to give the mould-board a proper projection.

P, P, P, Three Wooden Trundles, with which the handles are faſtened together; the under Trundle is not ſeen in this view of the plough.

Q, The right Handle, is fixed obliquely to the left, being four inches further from the point of the ſhare than the left handle; the diſtance between the two handles is four inches and an half, at their under ends; and two feet eleven inches, inſide meaſure, at their points, or upper ends.

R, The left Handle, into which the beam is mortiſed; diſtant from the ſhank of the ſhare fifteen inches.

a, The Wheel at the right ſide of the carriage, runs in the furrow, and is twenty-one inches and an half in diameter.

b, The Wheel at the left ſide, runs on the land, and is ſeventeen inches in diameter.

c, The Stock, or Wooden-bed of the Carriage, with an iron axle-tree let in, and faſtened thereto: its length from nave to nave is thirteen inches; ſeven inches broad, and three inches and an half thick.

d, d, Two concave Iron Wedges, faſtened to the beam with two

two ſmall chains; theſe wedges are occaſionally made uſe of to fix the beam to the iron rod f, in ſuch a manner as to throw the plough more or leſs into the ground.

e, A flat curved Rail, eighteen inches long, five inches broad in the middle, and three quarters of an inch thick: at each end of this Rail there is a mortiſe to receive the ſtiles g, g, and in the middle of it there is a round hole for the iron rod f to paſs freely through.

f, A round Iron Rod, two feet ſeven inches long, and one inch diameter: this rod paſſes through the beam and curved rail, and a round iron ſtaple in the ſtock of the carriage.

g, g, Two Stiles, two feet long, three inches broad, and three quarters of an inch thick; their under ends are mortiſed into the ſtock of the carriage, and their upper ends into the curved rail e, projecting three inches above its upper ſurface: theſe Stiles are pierced through with ſmall holes to receive two iron pins, which ſupport the moveable rail, and regulates the depth of the furrow.

h, The moveable Iron Plate, or Rail, is eleven inches and an half long, three inches broad, and a quarter of an inch thick: at each end of this plate there is an aperture which embraces the Stiles g, g, to which it is fixed with the two iron pins before-mentioned.

i, The Bridle, or Iron Frame, is thirteen inches long, one inch and an half broad, and a quarter of an inch thick; the arms of the Bridle paſs through the ſtock C, and are faſtened thereto with two iron pins, or wedges.

K, K,

k, k, Two Iron Links, or Rings, to which the cattle are faſtened when the plough is ſet to work.

l, l, l, l, Four wooden Waſhers, four inches in diameter, and three quarters of an inch thick; theſe Waſhers are fitted looſely on the iron axle-tree, and ſerve to ſet the wheels at a greater or leſs diſtance from each other, by taking off, or adding to the number of Waſhers on the axle-tree.

m, The Tugg-chain, is linked to the hind ſheat G, and to a ſtrong iron ſtaple faſtened to the ſtock of the carriage.

FIGURE II.

A Plan of the HIND-SHARE, *with its Shank and Ground-Reſt.*

I 2d, The Share, is one foot ſix inches long, and ſeven inches and an half broad.

K, The Ground-reſt, is faſtened to (T) the iron ſtaple, welded to the ſhank of the ſhare: its extreme length is two feet five inches; its breadth two inches and an half, and one inch thick, gradually diminiſhing towards its fore end, where it is only one eighth of an inch thick; its back end is faſtened to the handle Q, &c. with the bolt and wedge L; and the fore end, to the ſhank of the ſhare, as before-mentioned.

L, L, 2d, The Iron Bolts and Wedges, with which the ground-reſts and ſhanks of the ſhares are faſtened to the handles, &c.

S 2d, The Shank of this Share, is two feet three inches long, meaſuring from its back end to the fore end of the ſtaple.

T 2d, An Iron Staple, welded to the ſhank of the ſhare to receive the under end of the ſheat B, to which the fore ends of the ground-reſt is faſtened, as repreſented in Fig. 2.

FIGURE III.

I 1ſt, A Plan of the fore Share, with its ſhank and ground-reſt: the ſhare of the fore plough is one foot five inches long, and ſeven inches broad.

K 1ſt, The Ground-reſt, is thirteen inches long, and ſeven inches broad.

L, L, 1ſt, The Bolts and Wedges, with which the ground-reſt and ſhanks of the ſhare are faſtened to the plough.

S 2d, The Shank of this Share, is ten inches and an half long, from the fore end of the ſtaple to the extremity of its ſhank.

T 1ſt, The Iron Staple, to which the ground-reſt K is faſtened, and through which the under ſheat F 2d, is inſerted.

This Plough, and Mr. *Ducket*'s three-furrow Plough, were tried on a piece of ground of Mr. *Arbuthnot*'s, at *Martin-Abbey*, in preſence of the Committee of Agriculture, and ſeveral other gentlemen, who were of opinion that the Inventor was deſerving of a bounty of 50l. for the two Ploughs, to which the Society agreed, *December* 23, 1767.

CHAP.

CHAP. VI.

A Deſcription of Mr. WILLEY'S DRILL-PLOUGH.

PLATE I. FIG. I. *A perſpective View of the* PLOUGH.

A, A, A, THREE Carriage Wheels, two feet four inches diameter; the two hind Wheels are fitted to an iron axis, one inch ſquare, with ſcrews, nuts, holes, and pins, at each end, to ſet the Wheels wider or cloſer together.

B, A Conic Pulley, eight inches diameter at the baſe, and four inches and an half at the other end, having three grooves or channels on its periphery. This Pulley is faſtened to the axis, and turns with the two carriage wheels.

C, C, Two flat Iron Rods, two feet long, one inch and one-eighth broad, and one-fourth of an inch thick, with holes and ſpring bolts to regulate the depth of the drill or furrow.

D, D, Two Barrels, or Seed-boxes, made of wood, or tin, one foot diameter, and three inches and three quarters on the periphery, with holes of different ſizes ſuitable to the ſeed to be ſown.

E, An Iron Axis, two feet four inches and an half long, and three quarters of an inch ſquare, on which the barrels are fixed in ſuch a manner, as to ſet wider or cloſer together, at will.

F, A

F, A Conic Pulley, (with three grooves) eight inches diameter, fixed to the upper axis, and connected to the under pulley by a woollen band, or ſtring, which turns the ſeed barrels.

G, G, Two Beds, or ſliding Boards, two feet long, ſix inches and three quarters broad, and three inches thick; the trunks H, H, and ſtaves K, K, paſs through thoſe beds, and are faſtened thereto with wooden wedges.

H, H, Two Taper Trunks, through which the ſeed is conveyed into the drills: their extreme length is two feet ten inches; breadth at their upper ends is one foot four inches, and thickneſs ſeven inches, outſide meaſure; their under ends are four inches broad, and their back edges two inches thick, terminating in an acute angle at their fore or cutting edges. See the letter I, Plate 1. Fig. 1.

I, I, Two Iron Sockets, faſtened to the under ends of the trunks; their fore edges form acute angles, and perform the office of ſhares and coulters; the channels in their back edges ſerve to convey the ſeed into the drills.

K, K, K, K, Four Wooden Staves, or Tines, which paſs through the ſliding beds, and are faſtened thereto with ſmall wooden wedges. Theſe Staves ſerve as a harrow to cover the ſeed.

L, A Tranſom, or Croſs Brace, mortiſed into the upper rails of the carriage-frame.

M, M, The Handles, with which the plough is held and directed.

N, N, The Handles, with which the plough is lifted up from the ground when it is to be turned about or removed from one place to another.

O, A

O, A Wooden Frame, or Bridle, with its iron hook and ring, to which the cattle are faſtened: this bridle is peſminently fixed to the upper and under rails of the carriage-frame, inclining to the horizon ſixty degrees.

P, P, Two Tranſoms, or croſs Braces, two feet three inches long, inſide meaſure, three inches broad, and two inches thick. There is an aperture, or channel, cut in each of the Tranſoms, to admit the iron bolts, marked 1, 2, 3, 4, to paſs through, and ſcrew into the ſliding beds G, G; by theſe bolts the beds with their trunks, ſtaves, &c. are fixed in ſuch a manner as to make the drills of a greater or leſs diſtance from each other.

Q, Q, Two Iron Spring Bolts, faſtened to the upper rails of the plough-frame, in ſuch a manner that the tooth or pin in the middle of the bolts may freely enter into the holes in the iron rods C, C; their uſe is, to regulate the depth of the drills or furrows. See Q, Fig. 1. and Plate 2. Fig. 4, 5.

PLATE II. FIGURE II.

A Geometrical Plan of the PLOUGH.

A, A, A, Three Carriage Wheels, two feet three inches diameter; the iron axis of the two hind wheels is two feet two inches long, and one inch ſquare.

B, A Conic Pulley, with angular grooves, eight inches diameter at the baſe, and four inches and an half at its vertex.

G, G,

G, G, Two ſliding Beds, or Tables, which run in a groove, or channel, cut through each of the tranſoms P, P. Theſe beds may be ſet cloſer or wider aſunder, and properly fixed with the round-headed iron ſcrews, marked 1, 2, 3, 4.

N, N, The under Handles, with which the plough is lifted up from the ground at the end of every bout, or turn, &c.

O, A Bridle, or Wooden Frame, with an iron ring, to which the cattle are faſtened.

P, P, The two grooved Tranſoms, or croſs Braces, which contain the ſliding beds G, G.

FIGURE III.

P, A Plan of one of the Tranſoms, with its groove or channel turned uppermoſt to ſhew its groove.

FIGURE IV.

C, A Plan of one of the flat regulating Irons.

FIGURE V.

A Plan of one of the Spring Bolts. See the explanation of Q, Q, Fig. 1.

This Plough with ſeveral others were tried on a piece of ground at

at *Brumpton*, *April* 10, 1766, in preſence of the Committee of Agriculture, who came to a reſolution to divide the premium of 50l. as follows: to the Rev. Mr. *Gainſborough* 30l. and to Mr. *Willey* 20l. to which reſolution the Society agreed, *May* 14, 1766.

CHAP. VII.

A Deſcription of the Rev. Mr. HEWETT'S HORSE-HOE and HARROW.

FIG. 1. *A perſpective View of the* HOE *and* HARROW.

A, THE Share, is ſeven inches from A to A, fourteen from B to B, and three eighths of an inch thick on its back edge.

B, B, The curved Sides or Shoulders of the Share, are turned up at right angles with the face of the ſhare; their extreme length is ten inches; breadth four inches, at their under ends, and two at their upper, inclining to the horizon about ſixty degrees.

C, C, Two curved Irons, fourteen inches long, one inch and three-eighths broad, and a quarter of an inch thick: theſe Irons are connected to the ſhafts M, M, with the round iron bolt,

bolt, ſcrew and nut D, and to the ſides of the ſhare with the two iron pins E, E, chained to the under ends of the handles K, K; theſe curved irons are pierced through with holes a quarter of an inch diſtant from each other, and ſerve occaſionally to alter the inclination of the ſhare, &c.

D, D, Two Iron Pins, four inches and an half long, and three-eighths of an inch thick, with ſquare heads, ſcrews, and nuts; theſe pins ſerve to faſten the curved irons C, C, to the ſhafts M, M.

E, E, Two Iron Pins, faſtened with ſmall chains to the under ends of the handles; theſe pins are occaſionally moved from one hole to the other of the curved irons, when the inclination of the ſhare is to be altered.

F, An Iron Frame, with two arms, and a travers, or croſs bar, to which there are three tines, nine inches long, one inch and a quarter broad, and three-eighths of an inch thick: in the fore end of the arms there is a round hole for the bolt G to paſs through, and admit the harrow to turn freely thereon.

G, A round Iron Bolt, with a ſquare head at one end, and a ſcrew and nut at the other; this Bolt ſerves as a brace to the two curved irons B, B, and as a ſpindle for the arms of the harrow to turn on; its extreme length is one foot three inches, and thickneſs five-eighths of an inch.

H, A Travers, or Wooden Rail, one foot one inch long, two inches and an half broad, and one inch and a quarter thick: this Rail is mortiſed into the handles of the hoe twelve inches diſtant from their nether ends.

I, A Rope, faſtened to one of the handles of the hoe, and

to

to the croſs bar of the harrow: this Rope ſerves to take up the harrow when the weeds are raked together in ſmall heaps, at convenient diſtances to be taken up and carried off.

K, K, The Handles of the Hoe; their extreme length is three feet; breadth, at their nether ends, two inches; thickneſs, one inch and an half.

L, An Iron Bolt, or Brace, one foot three inches long, and three quarters of an inch thick, with a ſquare head at one end, and a ſcrew and nut at the other; this Bolt paſſes through the ſhafts, and is faſtened thereto with a ſcrew and nut, as before-mentioned.

M, M, Two curved Iron Shafts, three feet ſix inches long, one inch and an half broad, and three-eighths of an inch thick: in the fore end of each of theſe Shafts there is a hole to receive the round ſpindle or axis N: the Shafts are made ſtraight from their points, back to the bolt L; and from thence, to the ſide-irons of the ſhare, they are bent to a ſegment of a circle, whoſe diameter is ſixteen inches.

N, A round Iron Spindle, or Axis, which paſſes through the nave of the wheel, ſhafts, and bridle P: this Spindle is one foot ſix inches long, and three quarters of an inch diameter, having a flat round head at one end, and a ſcrew with a nut at the other; at each end of this Spindle there is a flat iron ring, or waſher, between the head of the Spindle and the bridle, and another between the nave and the ſhaft.

O, The Carriage Wheel, is three feet diameter, and two inches broad on its periphery.

P, The Bridle, or round Iron, with an eye or hole in its

fore end, to which the whipple-tree is faſtened; its inner ends are flatted and pierced with holes to receive the ſpindle, or axis of the carriage wheel; the diſtance of theſe holes to the eye in its fore end is two feet three inches.

The Committee of Agriculture took into conſideration the experiments made with this Horſe-Hoe on *Kennington-Common*, the 24th of *May*, 1770: Reſolved—It appeared to the Committee, that the Rev. Mr. *Hewet*'s Hoe is very compact, and particularly convenient in turning on head lands; and that its large wheel, and iron ſegments to gauge and regulate the depth of the Hoe in the ground, renders it preferable to the ſhims in common uſe; but it was apprehended that the breadth of the ſhare might be ſo contrived as to be ſet to intervals of different breadths. The Committee reſolved to recommend to the Society to give their gold medal to the Rev. Mr. *Hewet*, for his communication of his Horſe-Hoe: to which reſolution the Society agreed *May* 30, 1770.

CHAP.

CHAP. VIII.

A Deſcription of the Rev. Mr. HEWET'S HORSE-HOE, *for deſtroying Weeds and Ant-hills, and alſo for cutting Turf.*

FIG. 1. *A perſpective View of the* HOE.

A, THE Frame of the Hoe, conſiſting of two ground-reſts, two ſills, two tranſoms, two poſts, a croſs rail and two handles.

B, B, Two Sills, two feet four inches long, three inches and five-eighths broad, and one inch and three quarters thick.

C, C, Two Tranſoms, nineteen inches long, (inſide meaſure) mortiſed through the ſills: the fore Tranſom is three inches and three-eighths broad, and two inches thick; the hind Tranſom is two inches and a quarter broad, and two inches thick, diſtant from each other ſeven inches and three-eighths.

D, D, Two Poſts, two feet three inches long, two inches and an half broad, and two inches and a quarter thick; the under ends of theſe Poſts are mortiſed into the ſills B, B, and their upper ends are halved into the handles G, G.

E, E, The Iron Sides, or Returns of the Share K, are one-fourth of an inch thick, ſixteen inches long, three inches and three quarters

quarters broad at their fore ends, and two inches broad at their back ends; theſe ſides are turned up at right angles, with the face of the ſhare, and are faſtened with two wood ſcrews through each ſide to the curved ground-reſts F, F.

F, F, The two curved Ground-reſts, are fourteen inches and an half long, (from point to point) ten inches and an half broad, and one inch and ſeven-eighths thick; their under edges are ſhod with iron, to prevent the wood from wearing: on the outſide of each of theſe Ground-reſts there are two plates of iron, with holes to receive two ſhort iron bolts, with ſcrews and nuts, which ſerve occaſionally to ſet the ſhare more or leſs into the ground, and to a proper degree of inclination, for the purpoſe intended.

G, G, The Handles, are mortiſed into the ends of the ſills, and halved to the poſts D, D, as before mentioned: their extreme lengths are four feet nine inches; their breadths at their under ends are two inches and three quarters; and their thickneſs one inch and an half.

H, H, H, Three Coulters; two of them paſs through the ſills and ground-reſts, the other through the tranſom C, and the ſhare K, to which its point or under end is rivetted four inches and an half from its cutting edge: the two ſide Coulters are one foot ten inches long, two inches and an half broad, and three quarters of an inch thick, on their back edges, inclining to the horizon fifty-two degrees: the middle Coulter paſſes through an aperture in an iron plate, faſtened to the upper ſide and edge of the fore tranſom C: the length of this Coulter is ſeventeen inches and an half, its breadth in the blade is two inches and an half,

and

and half an inch thick on its back edge, inclining to the horizon forty degrees.

I, I, I, Three Iron Wedges, which ſerve to ſet and fix the coulters to a proper depth and inclination: the middle wedge forces forward the ſhank or upper end of the middle coulter, till the iron plate on the fore tranſom C, enters into the notch intended to receive it; by which means both the ſhare and the coulter are regulated and duly fixed.

K, The Share, is twelve inches and an half, from its point to the back edge, and from E to E, its returned ſides, are twenty inches (inſide meaſure.)

L, L, Two curved Iron Arms, twenty inches and an half long, and three inches and a quarter broad.

M, M, Two Iron Ears, welded to the curved arms, projecting horizontally one inch and an half from their upper edges, and elevated two inches and three quarters above the ſills B, B, leaning a little towards the handles G, G, leaving an interval, or void ſpace of one inch between the handles and the ſaid Ears, when the ſhare or hoe lies horizontally on the ground. The uſe of the Ears are to prevent the handles from riſing too high; and the void ſpace is intended to give room for the handles to riſe and turn on the iron bolt P, till the ſhare or hoe is ſet in a proper direction to enter into the ground.

N, An angular Tugg-frame; its fore ends are ſet off at right angles, and rivetted to the arms L, L, twelve inches and an half diſtant from the bolt P.

O, The Carriage Wheel, is two feet diameter, and two inches broad on its periphery; an iron ſpindle paſſes through its nave and the bridle Q, and the curved arms L, L.

P, A

P, A round Iron Bolt, which paſſes through the fore ends of the ſills B, B, and a round hole in the end of the angular tugg-frame N.

Q, The Bridle, is fifteen inches and an half long, from the ſwivel or hook, to the ſpindle or axis of the wheel.

R, The Travers, or croſs Rail, nineteen inches long, (inſide meaſure) two inches broad, and one inch thick.

FIGURE II.

A Geometrical Plan of the SHARE.

E, E, The returned Sides of the Share, are three inches and three quarters broad, and turned up at right angles with the face of the ſhare.

H, The middle Coulter, is ſeventeen inches and an half long, two inches and an half broad, and half an inch thick on its back edge, as before-mentioned.

K, The Share. See the deſcription of K, Fig. 1.

FIGURE III.

A perſpective View of the SHARE, *with its middle Coulter.*

E, E, The Sides of the Share.

H, The Middle Coulter.

K, The curved Plate, or Share.

This

This Horſe-Hoe was tried at *Kennington-Common*, the 24th of *June*, 1770, in preſence of the Committee of Agriculture; but ſome doubts ariſing whether the trial was properly made, and whether the machine was conſtructed agreeable to the model, the Committee poſtponed the further conſideration of it; to which the Society agreed, *May* 30, 1770.

CHAP. IX.

A Deſcription of Mr. RINGROSE'S PLOUGH, *for turning up Heath Ground.*

A, THE Bridle, is one foot long, faſtened with an iron bolt through the fore end of the beam.

B, The Beam, is eight feet long, and four inches ſquare at the tail end, diminiſhing from the firſt coulter to the fore end B, where it is only three inches ſquare.

C, The Cleat, or Piece of Wood nailed to the ſide of the Cleat, is one foot eleven inches long, three inches broad, and two inches thick; in the ſide of this Cleat there are two notches,

or

or mortiſes, to receive the ſemi-circular tongues of the gauge and preſſer D, F.

D, The Tongue of the Preſſer, is three inches broad, and one inch thick; its upper end paſſes looſely through the fore mortiſe of the cleat, and is faſtened thereto with an iron pin, which is its center of motion.

E, The Foot of the Preſſer, or curved Gauge, is nine inches and an half long, from the heel to the toe, and ſeven inches broad, including its tongue. This Gauge ſerves to regulate the depth of the furrow, and to preſs or lay down the heath before the coulters and ſhare.

F, The ſemi circular Tongue of the Preſſer, is pierced with holes which are about half an inch diſtant from each other: its under end is mortiſed into the foot of the Preſſer, and is raiſed or depreſſed by moving the iron pin which paſſes through it.

G, The Fore Coulter, is one foot eleven inches long, four inches broad, and three-fourths of an inch thick, on its back edge. This Coulter is ſet in a right line with the point of the ſhare and the hind coulter, for which purpoſe it is bent, or turned off at right angles, under the beam, as repreſented in Fig. 2; but it is ſet in a contrary direction to the hind coulter, in order to preſs and cut the heath as it paſſes over it. Its angle of inclination is twenty-five degrees, and its cutting point is two feet ſeven inches diſtant from the point of the ſhare, and four feet from the fore end of the beam.

H, The hind Coulter, is two feet long, four inches broad at the upper end, and one inch and an half broad at its point, which is one foot ſix inches diſtant from the point of the ſhare, inclining to the horizon twenty degrees.

I, The Plough-ſhare, is one foot two inches long, from its point to the fore end of the ground-reſt, and ten inches and an half from its point to its ſhoulder; its extreme breadth is nine inches and an half.

K, A round Iron Bolt, or Brace, one foot ten inches long, and one inch thick, with a flat head inſerted into the bottom of the ground-reſt, and a mortiſe and key to faſten it to the upper ſide of the beam; its diſtance from the point of the ſhare is nine inches and an half, and its upper end one foot nine inches diſtant from the tail-end of the beam.

L, The Mould-board, is two feet ſix inches long, one foot three inches broad, and one inch and an half thick: its tail-end projects one foot four inches and an half from the ſide of the beam, and is faſtened thereto with a ſtrong wooden trundle, which paſſes through it and the beam: it is faſtened alſo with nails to the under part of the right handle, and another trundle through the ſheat; its inclination to the horizon is ten degrees.

M, The Sheat, is two feet ſix inches long, four inches and an half broad, and two inches and a quarter thick: its fore edge is one foot one inch diſtant from the point of the ſhare, and its angle of inclination twenty degrees; its under end is mortiſed into the ground-reſt, and its upper end into the beam.

N, The Ground-reſt, is one foot eleven inches long, from its tail-end to the ſocket of the ſhare, four inches broad, and three inches thick.

O, A Wooden Trundle, driven through the under part of the mould-board, right handle, and ground-reſt.

P, A Wooden Brace, mortiſed into the ſheat and the under ſide of the beam.

Q, A Wooden Trundle, driven through the right handle and the beam.

R, R, The Handles, with which the plough is held and directed: the extreme length of the right handle from the ground-reſt to its upper end, is five feet; its width at the bottom, four inches; and its thickneſs, two inches and an half: the length of the left handle is four feet one inch; its breadth, four inches and an half; and its thickneſs, three inches.

This Plough was referred to the Committee of Agriculture, who was of opinion that the addition of the fore coulter, the manner of its operation, and the particular uſe of the gage were new; and, from the teſtimony of Mr. *Hanbury*, very uſeful in breaking up heath ground.

A Deſcription of Mr. RINGROSE'S THISTLE-CUTTER.

FIG. 1. *Geometrical Plan of the* MACHINE.

A, The Whipple, faſtened to the two ground-ſills.

B, The double Chain, or Rope, two feet eight inches long, faſtened to the whipple and the fore ends of the ſills.

C, C, Two Scythes, three feet eight inches long, from point to point, and four inches and three quarters broad, at their fore ends,

ends, which meet in a point between the double chain, or rope, and are faſtened to the ſills with four wood-ſcrews; their points or ſharp ends extending three feet one inch from the joint of the fore hinge.

D, D, Two round Iron Staples, driven into the fore end of the ſills, to which the double chain is faſtened.

E, E, Two Iron Hinges, faſtened with wood-ſcrews to the upper ſurface of the ſills.

F, F, Two Braces, two feet five inches long, two inches broad, and two inches thick, at their back ends, and one inch at their fore ends, where they are dovetailed, and let in even with the upper ſurface of the ſills, and faſtened thereto with wood-ſcrews. There is an aperture, or mortiſe, ſawed into the fore ends of the braces to receive the back edges of the ſcythes, which are faſtened thereto with iron pins.

G, G, Two ground Sills, four feet three inches long, four inches broad, and three inches thick: theſe ſills are parallel to each other, and are connected with two ſtrong iron hinges, ſcrewed to their upper ſurface; the fore ends of the ſills are cut up a little ſlanting from their under ſides, as repreſented in Fig. 2.

This inſtrument, by means of the double ſills and hinges, may be uſed with both the ſcythes horizontal, or with one or both ſet to any degree of elevation, by which means any unevenneſs of the ground, or obſtruction on its ſurface, ſuch as ſtones, roots, ant-hills, &c. may be eaſily avoided; by this contrivance alſo, the ſcythes may with great facility be put into a proper poſition to be whetted, when there is occaſion.

H, H, Two Arms, eight inches and an half long, from the ſhoulder

ſhoulder of their tenons to their outer ends, four inches broad, and two inches and three quarters thick, mortiſed at right angles into the ſides of the ſills, and even with its upper ſurface.

I, I, Two Handles, ſix feet three inches long, and four inches ſquare, at the bottom: with theſe handles the inſtrument is directed, and ſet to any degree of inclination, either to the right ſide, or left, or both.

FIGURE II.

A Profile of one of the Sills, Handles, &c.

The Committee of Agriculture examined this inſtrument, and was of opinion that Mr. *Ringroſe* deſerved a bounty of ten guineas, on condition he would leave the model of the Heath-Plough, and the model of the Thiſtle-Cutter, as the Society's property; to which the Society agreed, *March* 16, 1763.

CHAP. X.

A Deſcription of Mr. ARBUTHNOT'S Double FURROW-PLOUGH.

FIG. 1. *A perſpective View of the* PLOUGH.

A, THE Share, is two feet two inches long, and fifteen inches broad, riſing with an angular creſt on the middle of its upper ſurface.

B, The

B, The Coulter; its extreme length is three feet two inches; its breadth is three inches in the blade, and one inch and an half in the ſhank, inclining to the horizon about forty degrees, and is four feet two inches diſtant from the point of the beam to the inner ſide of the mortiſe.

C, The Share-brace and Hook, with an iron key, or wedge, driven through a mortiſe in the upper end of it.

D, The Breaſt-plate: its height from the ſhare to its upper or angular point, is two feet; and at its back edge, eighteen inches; its breadth at the top, is four inches, and at the bottom, nine inches, inclining to the horizon about forty-five degrees.

E, E, The Mould-board, or Iron Wings, are eighteen inches and an half broad on their upper ends, nineteen inches and an half broad at their under ends, and one quarter of an inch thick.

F, The Beam, is ſix feet nine inches long, from its fore end to the ſhoulder of its tenon; the thickneſs of the beam is four inches and a quarter by three and a quarter at the ſhoulder of its tenon, which is inſerted into the beam-poſt H. The whole length of the plough, from the fore end of the beam to the extremity of its handles, is eleven feet two inches and an half.

G, The Sheat, is two feet two inches long, five inches and an half broad, and one inch and an half thick; its back edge is eleven inches and three quarters from the ſhoulder of the beam, inclining to the horizon forty degrees.

H, The Beam-poſt, is three feet two inches and an half long, four inches and three quarters broad, and three inches and a quarter thick; its under end is mortiſed into the ground-reſt; in the middle of this poſt, there is a mortiſe to receive a tenon in the tail end of this beam; the handles are alſo faſtened to this poſt with wooden trundles, wedges, and nails.

I, I,

I, I, The Handles of the Plough, are two feet nine inches diſtant from each other at their points or upper ends.

K, An Iron Caliper, whoſe fore ends are faſtened with the iron pins h, h, to the inner ſides of the mould boards, or bended iron wings; the outer ends of the Caliper are pierced through with holes to receive the hook L, which ſerves to fix the Caliper, &c. to the degree of expanſion required.

L, An Iron Hook, faſtened to the beam-poſt H.

M, An Iron Ring, or Link, three inches diameter, which paſſes looſely through a hole in one of the arms of the caliper, and is laid over the other arm to fix the caliper, when the mould-boards are opened to their full extent.

N, The perpendicular Shank of the Gauge-plate.

O, A flat Staple, which embraces the ſhank of the gauge-plate, and the flat-headed ſcrew P, with which the gauge is fixed as need requires.

P, A flat-headed Iron ſcrew, which, paſſing through the ſtaple O, and perpendicular ſhank N, ſcrews into the end of the ground-reſt R, and ſerves occaſionally to elevate or depreſs the gauge.

Q, An horizontal Iron Plate, or Gauge, five inches ſquare, and half an inch thick, with a perpendicular ſhank pierced through with holes to receive the iron ſcrew, with which it is ſet to a proper degreee of elevation.

R, The Ground-reſt, is three feet four inches long, five inches and a quarter broad, and four inches thick; the extreme length of the plough, from the point of the ſhare A to the end of the ground-reſt R, is four feet four inches.

S, S, Two Screws and Nuts, with which the ſhank of the ſhare is faſtened to the ground-reſt.—N. B. Only one of the Screws and Nuts appear in this view of the plough.

T, A round-headed Iron Bolt, ſixteen inches long, and five eighths of an inch thick, with a hole through its upper end for an iron pin, or ſcrew, to keep it in its place; this bolt paſſes through the eyes of the four iron plates or hinges V, V, V, V, which are properly fitted and rivetted to the breaſt-plate and iron wings, or mould-boards, and ſerves as a ſpindle for them to turn on.

V, V, V, V, Four Iron Plates, or Hinges, three inches long, two inches and a quarter broad, and three-ſixteenths of an inch thick, rivetted to the breaſt-plate and iron wings.—N. B. Only one of thoſe hinges are ſeen in this View of the Plough.

U, An Iron Bolt, or Brace, which paſſing through the ground-reſt, beam-poſt, and beam, is faſtened thereto with a ſcrew and nut, to ſtrengthen the tail end of the plough.

W, The flat-headed Iron Pin, or Screw, which paſſes through the upper end of the bolt, or ſpindle T.

X, X, X, Three Clamps, or pieces of Iron faſtened to the beam, to prevent it from ſplitting.

Y, An Iron Hook, faſtened to the upper end of the beam, and is occaſionally ſet in the holes of the curved gauge, to regulate the depth of the furrow.

Z, An Iron Gauge, or Regulator, being a ſegment of a circle, pierced through with holes. This ſegment is about an eighth part of a circle, whoſe radius is three feet four inches, two inches broad, and three quarters of an inch thick: its ſhank is three feet, two inches long, and one inch ſquare, with a hole at its extremity, for the hook d to paſs through.

a, a, The Carriage-wheels, are two feet in diameter, and two inches broad on their periphery.

b, An Iron Axle-Tree, twenty inches and an half long, and one

one inch and an eighth ſquare in the middle, with a ſmall ſhoulder on each face, for the under end of the ſegment to bear againſt, to which it is faſtened with a feathered bolt or wedge thro' the axle-tree.

c, c, Two Wooden Ferrils, or Waſhers, four inches in diameter, and one inch thick: the uſe of theſe waſhers is to ſet the carriage-wheels at a greater or leſs diſtance from each other, as occaſion requires.

d, An Iron Hook, which paſſes through a hole in the end of the ſhank of the gauge, and ſerves to fix the axle-tree, gauge, &c. to the beam, to which it is faſtened with ſtrong wood-ſcrews.

e, An Iron Plate, fourteen inches long, two inches and an half broad, and three-eighths of an inch thick. This plate is fixed in an horizontal poſition cloſe under the caliper; its fore end is turned down ſlanting, and faſtened to the ſheat G; its tail end is turned up, and faſtened to the beam-poſt H: in the middle of this plate, there is an aperture thirteen inches long; its uſe is to guide the iron pin f, and regulate the motion of the caliper, &c. this plate ſerves alſo as a brace or ſtay to the beam-poſt and ſheat.

f, A round-headed Iron Pin, with which the caliper is connected to the directing plate e: the under end of this pin, paſſing through the aperture in the plate, is thereby directed ſo as to procure a regular motion to the caliper, mould-board, &c. See Fig. 6.

g, g, Two Iron Plates, with two horizontal ears rivetted to each of them: theſe ears embrace the fore ends of the caliper, and is connected thereto with the iron pins h, h, one of which is only ſeen in this View.

FIG. 2. *A perſpective View of the* AXLE-TREE, *&c.*

b, The Shoulder, againſt which the ſegment is fixed.

FIG. 3. *A Plan of the* SHARE *and its* SHANK, *&c.*

A, The Share.

S, S, Two Screws, with which the ſhank is faſtened to the ground-reſt.

FIG. 4. *An Elevation of the* GAUGE, *or* REGULATOR, *with its Shank.*

Z, The Segment, or Gauge.

FIG. 5. *A perſpective View of the* TAIL-GAUGE, STAPLE, *&c.*

N, The Shank of the Gauge.

O, The flat Staple.

P, The flat-headed Screw.

Q, The horizontal Plate, or Gauge.

FIG. 6. *A Plan of the* CALIPER, *&c.*

e, The Guide-Plate.

f, The Center Pin of the Caliper.

K, The Caliper.

L, The Hook.

M, The Iron Ring.

FIG. 7. *A perſpective View of the* HINGES, *and* IRON PLATES, *with two Ears, &c.*

g, The Plate, with its ears.

h, The Iron Center-Pin which paſſes through the ears.

FIG. 8. *A View of the* BOLT *and* HINGES *of the Mould-Board.*

T, The Iron Bolt.

V,V,V,V, The Plates, or Hinges.

W, The flat-headed Iron Screw.

The

The following is a Copy of Mr. CUTHBERT CLARKE's *Account of his new conſtructed* PLOUGH, *ſent to the* Society *for the* Encouragement of Arts, Manufactures, and Commerce.

"AS the line of traction is of very great importance to be well conſidered, in order to form a true idea of the principles of conſtructing a plough upon a rational theory, I ſhall attempt in the firſt place to explain its properties; firſt, as it affects the horſes which draw the plough; and ſecondly, in what manner it affects the plough.

"As the ſhoulders of theſe kind of horſes, which are allowed the moſt proper for ploughs, &c. generally lay at an angle of about ten degrees thirty minutes, computed from a perpendicular, as A, B, C, in Fig. 1, in order to have the collar impinge upon the greateſt ſurface of the ſhoulders, (a thing abſolutely neceſſary to preſerve the ſkin upon their ſhoulders, &c.) and to give the creatures the beſt chance for reſpiration, and uſing to the greateſt advantage their muſcular force, the line of traction ought to lay at right angles, to that which their ſhoulders make with a perpendicular, as aboveſaid.

"A demonſtration of the above aſſertions, which I believe deſerves the authority of axioms, would require a more copious deſcription of the mechaniſm of a horſe, &c. than the nature of this eſſay will admit of, therefore muſt leave any further remarks

marks to be determined by obſervation, &c. The angle of the line of traction to interſect the angle of the ſhoulders, ought therefore to make an angle with the horizon of ten degrees thirty minutes, as F, Fig. 1.

" Having fixed the line of traction, and ſhewn what appears to me to be the good effects of this poſition in regard to the horſe, &c. I ſhall conſider in the next place its effect upon the plough.

" The place of contact of the line of traction and plough ought, if it were practicable, to be at the point of the ſhare, as at or near that point the center of percuſſion lays: but as it is impoſſible the line of traction can be connected at that point without interrupting the operation of the inſtrument, another point muſt be ſubſtituted, and in courſe ought to be as near to the point of the ſhare as the convenience of the inſtrument will admit of, for the greater the diſtance, the longer the lever, and conſequently the more powers the ſhare, &c. gain; and their powers have a tendency to ſink the ſhare into the ground rather than communicate to it an horizontal motion. To fix this diſtance, as I ſaid before, there is no certain rule, but that it muſt be the leaſt the convenience of the inſtrument will admit of, and that, I humbly preſume, cannot be leſs than fourteen inches in a plough which is to perform only common work, taken perpendicular above the point of its ſhare, as the line D, E.

" From the above conſiderations, it muſt be abſurd to connect the line of traction at an angle behind the point of the ſhare, as it unavoidably either loads the wheels unneceſſarily, by giving the ſhare too great a tendency to ſink in tothe ground; or if no wheel, cauſes the

the tail of the plough to riſe, ſo as to make it hop as it were upon the point of the ſhare; either of which gives the balance cruelly againſt the horſes, fatigues the holder, and ſpoils the land. The line of traction being fourteen inches above the point of the ſhare, at the point of contact with the plough, and upon the ſhoulder of a horſe fifteen hands high, will be about four feet one inch above the ſurface of the tract the horſe treads upon:* the line of traction will be ſimilar to the line F, G, in Fig. 1. and the diſtance between theſe two points is fourteen feet ſix inches, of which ſix feet muſt be allowed for length of beam and caps; (the neceſſity of which will be ſhewn hereafter;) then remains eight feet for the horſes body, whipples, &c. a ſpace I humbly preſume very convenient for a horſe of the above ſize, and if longer, and requires more length, or ſmaller, and can do with leſs, the poſition of the line of traction remains the ſame, becauſe this angle is proportioned to the mean height. The poſition and length of the line of traction being aſcertained, I ſhall next point out how the powers the elevation of the place of connection of the line of traction give to the ſhare, which have a tendency to make the ſhare ſink too much into the land, muſt be countervailed both in the ſowing and wheel-ploughs.

" And firſt, of the ſowing plough; the method to countervail the above-mentioned bias in this plough, depends upon the length and poſition

* I would not be underſtood to mean that this is the preciſe point that every horſe of that height ſhould pull at; for there is a great difference in the depth of the cheſts of horſes, and regard ought to be paid to that; but in general the above height will anſwer very well, as hereafter ſhewn.

poſition of the beam, and place of connection of the line of traction; for, by the beam being kept low at the point where the line of traction connects, the horſes, &c. have a purchaſe to countervail the bias; and as this commonly is or ought always to be limited by the convenieney of the inſtrument, which I ſhall ſuppoſe may be fourteen inches above the ſurface of the land at the end of the beam, and the ſame height above the point of the ſhare; I ſhall alſo ſuppoſe that the line of traction is elevated at the horſes ſhoulder four feet and one inch, as in the above computation; then we have a balance of twenty-nine powers in favour of the countervailing power.* This will be ſufficient to overcome all the reſiſtance the ſhare and coulter meets with, &c. when the ſoil is yielding, which are the only ſeaſons the ſowing-plough can be uſed to any purpoſe; for when the ſoil is ſtubborn, or a great depth to be ploughed, a more effectual contrivance to countervail the bias, which the ſhare, &c. has required, by the reſiſtance of cutting and raiſing the furrow, and by the elevation of the place of connection of the line of traction, muſt be applied.

" And of all the ſimple mechanical powers, I cannot ſee any better ſuited to anſwer the purpoſe than the beam O, being a lever of the ſecond kind, with its fulcrum R, Q. It is true, a prop, or fulcrum, let fall from the point M, upon the line of traction at N, were the line of traction inflexible, and no obſtacle at

the

* Taking the plough to be ſix inches within ground, or making a furrow ſix inches thick; the fourteen inches above the ſurface, and thoſe ſix make twenty, which, ſubtracted from forty-nine, remains twenty-nine, as above: a further demonſtration of this will be given in the explanation of the countervailing power of the wheel plough.

the point of the ſhare, that the plough would keep its bottom D, S, in an horizontal direction, becauſe the angle M, N, E, and D, M, E, are ſimilar, and the line of traction paſſes through the center of gravity of the figure they conſtitute; but as the obſtacle upon the ſhare, &c. occaſioned by cutting and raiſing the furrow, &c. is ſo very great as almoſt to equal the effort of the whole moving power, there is the greateſt neceſſity to provide further againſt that bias, by continuing the beam O to the greateſt diſtance the conveniency of the inſtrument will admit of; which I humbly preſume is at P, and there let fall the prop, or fulcrum R, with its wheel Q, whoſe diameter ſhould be the greateſt the ſpace between the top of the furrow, which is to be cut, and the beam will admit of, becauſe the force required to draw a wheel over an uneven ſurface, is inverſely, as the ſquare root of the diameter of the wheel. What is further neceſſary to be relative to the explanation of the appendage of this wheel, as the uſe of the appendage is chiefly for regulating the depth of the furrow, &c. I ſhall defer until I come to mention the other regulating parts, and proceed to explain the method of abating the friction of the coulter and ſhare, and the parts concerned in turning the furrow, as follows:

"The edges of the coulter and ſhare, as they cut the furrow from the ridge, ought to be placed at ſuch angles as would give them the greateſt advantage, which might be aſcertained preciſely, were the velocity of the moving power and the reſiſtance of the ſoil always of one tenor; but as there is no certainty to be obtained with regard to the degree of velocity the plough may have, nor can unvariableneſs in the reſiſtance of ſoils, it will be uſeful to attend

attend a little to practice as well as theory, to hit upon the beſt general poſition for the cutting parts to be laid to; and the reſult of my endeavours for that end has determined me to fix upon an angle of forty-nine degrees with the horizon, for the edge of the coulter to be laid to. See D, Fig. 1.

"The coulter, beſides this angle, I preſume, ſhould likewiſe have its point, that is, as much of it as goes within the ground, bent ſideways to an angle of about ten degrees, the point inclining to the furrow. The uſe of this ſideways angle is to cauſe the furrow to riſe with more eaſe, by its being cut rather from above the land than below it, as is too often the caſe in practice, the coulters being generally ſet to an angle of about the ſame quantity in the contrary direction, which muſt wedge the coulter againſt the land-ſide of the ridge, as the ſhare raiſes it up: beſides this advantage, another no leſs material will be obtained by the coulter's being bent to the above angle, with its point to the furrow ſide, as aforeſaid; for when the furrow, with its under edge in turning, comes to reſt upon the bottom of the trench, being cut angular, it will be quite free from bearing upon the other edge, until the furrow is laid in its proper poſition, which abates the reſiſtance againſt the wriſt-board of the plough very conſiderably; and in taking up lays will prevent the furrows from falling down, becauſe the angle and the coulter cut the edge of the furrow which lays undermoſt to, ſerves to reſt it upon, and the center of gravity of the furrow being without the perpendicular, the angular point ſerves as a fulcrum to counter-act the elaſticity and ſpringineſs of the turf.

"The ſhare in courſe falls next to be conſidered; the figure to render it the moſt complete for cutting, and laying an equal

ſtreſs

ſtreſs on the plough, when a thin furrow is to be cut, and the ſoil yielding, would be ſuch a curve as a, b, c, Fig. 2.

" But, as ſtiff or gravelly ſoils require to be pointed, I have found the figure which ſuits beſt in general, to be ſuch as a, d, c; but however far it may be found neceſſary to alter the point of the ſhare in regard to length, or taper, at all events the fin c ought to be held the full width of the furrow, eſpecially in taking up lays in order to cut the furrow thorough; otherwiſe a part of the land muſt be torn up by the wriſt-board of the plough, which retards the motion very conſiderably, and often leaves ſlips of land unmoved, which is not only unſightly but detrimental.

" The furrow being now cut, the method to turn it completely at the leaſt expence of force ought next to be pointed out; and that ſort of wriſt-board, which I have found to anſwer beſt, is a compound inclined plain, whoſe baſe lays horizontal, and hypothenuſe ſubtends an angle thereto of nineteen degrees; the perpendicular ought to be a fourth more than the width of the furrow, and the greateſt or extreme projection at the haunch from the land ſide of the plough, taken upon a horizontal line, ought to be one-third more than the width and thickneſs of the furrow, which is intended to be turned; and the furrow ſide of the chip made exactly parallel to its land ſide, and eight-tenths of the width of the intended furrow in width. Nothing more is to be done to complete the wriſt-board, but to work it to a regular twiſt, from the point of the ſhare to the haunch, or extreme point of projection, to which the ſhare ſhould truly correſpond as far as it extends, and if of that ſort commonly called pan-ſhares, they may eaſily be made to anſwer that purpoſe. Thus a wriſt-board

may

may be conſtructed which has all the requiſites for turning a furrow, without any unavoidable reſiſtance or preſſure.

" The principles the above are deduced from are as follow, viz. The angle of nineteen degrees (which anſwers nearly to one inch of riſe, in three inches in length) cuts the perpendicular at the point where the furrow lies; its center of gravity begins to diverge (being projected by the extreme point or haunch) the full diſtance of the width of the trenchor furrow, and thickneſs thereof; and as the furrow is twiſted from the point of the ſhare upon its one edge to the ſaid point of extreme projection, the angle of nineteen degrees continues it upon the compound inclined plane, juſt ſpace enough to reduce the elaſticity of its parts, and the ſame of its thickneſs, and width of the furrow; as it is not ſhoved off its place below, muſt, if the under edge was even cut ſquare, put the furrow in equilibrio; but as it was by the ſideways angle of the coulter cut angular, and the apex acting as its fulcrum, the center of gravity becomes ſooner in equilibrio: and leſt any accidental obſtacle ſhould prevent the work being completed, a third of the width and thickneſs of the furrow is allowed over and above what ſeems ſufficient by calculation; and to prevent crumbs of ſoil from ruſhing in upon the body of the plough, a fourth more than the height of the furrow is propoſed; all which in practice have their uſes: and as I have had many wriſt-boards made upon this principle, which in every kind of ſoil did the part of turning the furrow very completely, I have been bold to ſay the conſtruction has all the requiſites for turning the furrow without any material waſte of force, &c.

" Having deſcribed the furrow ſide, I ſhall next conſider the land

ſide, which, from the point of the ſhare to the tail of the plough, is commonly about three feet long, in the common conſtruction, and ſtands parallel to the land, and rubs againſt it in every part, which occaſions a great deal of friction. The reaſon that ploughmen give for the chip or ſhare being continued to ſuch a length, is, that it gives the plough ſteadineſs, as they call it; but from experience I can affirm, that a plough, when other matters are ordered as above, goes as ſteady when its land ſide is but half that length: by thus ſhortening the land ſide, the friction is made ſo inconſiderable that it is not worth providing againſt by a friction wheel, &c.

" The friction which the bottom of the plough, as it is a ſled in the common conſtruction, comes next under conſideration, which I propoſe to abate by converting it into a wheel-carriage * in the following manner:

" That part of the ſhare which is within ground, and thoſe of the chip or ſoal of the plough, are loaded with the reſiſtance of cutting the furrow, and that of its weight in turning it over, &c. and has the bottom of the furrow, or rather trench, for its baſis, which is generally very rugged, conſequently the friction muſt be very great, as appears by the wear of thoſe parts: now as the friction upon a ſled, *cæteris paribus*, is to the friction upon a wheel-carriage in the proportion of the diameter of the wheel to the diameter of the axle-tree, the longer the wheel, or wheels are, that are applied, and the ſmaller the axle tree is, the better: but convenience is the criterion to determine that; and the nearer the point of the ſhare the

* This I tried ſixteen years ago with ſome ſucceſs (though not in the manner hereafter deſcribed); and one of the ploughs is now in being that was made at that time.

the wheels are fixed (as the greateſt preſſure is there) the more advantage they will give; and therefore I would have them to move on the outſide of the plough, for within the plough at a leſs diſtance than eighteen inches from the point of the ſhare, no wheel of a ſufficient diameter to abate friction to any amount can be placed. The method I uſe to apply the wheels at a leſs diſtance from the point of the ſhare, and of a diameter which will abate the friction above twenty times, is to paſs a ſtrap of iron X, X, from the chip Y up to the beam. This ſtrap, as it folds below the chip, and is firmly connected to the beam, contributes very much to the ſtrength of the inſtrument, as it lays at right angles to the top of the ſhare: through this ſtrap and the beam is a mortiſe of an inch and a quarter ſquare; into this mortiſe an iron axle-tree is put in an horizontal direction, and at right angles to the land ſide of the plough; on each end of this axle-tree is put a wheel of two feet diameter, about twenty-two inches apart (from the inſide of one to the inſide of the other); that which goes in the furrow is made diſhing a good deal, which prevents its being in the way of the furrow when turning. There is a contrivance to raiſe or lower any of thoſe wheels at pleaſure, by means of hand ſcrews, and fore locks. I prefer having wheels of equal diameters to that of a high wheel and a low one, becauſe the high wheel gains upon the low one continually, and thereby twiſts the plough out of its true direction, if not counterbalanced by the moving power, which is employing it very improperly upon thoſe wheels on which the whole weight of the body of the plough, &c. reſts; and as their centers are nearly perpendicular to the point of the ſhare, and all parts of the ſhare being ſo effectually braced up, the

the wheels become the baſis of the ſhare and plough, and always keep the bottom of the plough level, and therefore muſt form a furrow of an equal dimenſion in all its edges. It is true the ploughman cannot quite ſo eaſily twiſt the coulter to or from land by the handles when wheels are uſed in the above method, as when there are none: but although this ought chiefly to be regulated by the horſes, &c. yet a temporary agent has its conveniences, and inſtead of wrenching the handles, as in the common conſtruction, the ploughman is to ſhave a tiller, as V, in Fig. 1, a little to the right, or left, which by a very ſimple piece of machinery turns the wheel Q to right, or left, as need requires; and upon the principle that a three-wheel cart, &c. turns the wheel Q, twiſts the head of the beam, and conſequently the coulter into land, or the contrary inſtantly, without altering the thickneſs of the furrow, which is too often the caſe in the common conſtruction. The parts concerned in producing this effect are the block L, which is moveable upon a ſpindle; the tiller V is fixed into this block, but not the ſpindle: and to this block is likewiſe fixed two pieces of jack-chain, H, H, which are connected with the levers I, I, which have their fulcrums ſcrewed into the cops or ſtand R, P; their lower ends have mortiſes in them, which take in the ends of the axle-tree of the wheel Q, which is round, and ſlides backwards and forwards in the mortiſes in the caps, which are about two inches long. When the levers are not drawn by the chains, the wheel revolves in a direction parallel to the land ſide of the plough, and its axle-tree reſts againſt the ends of the mortiſes at right angles to the tract of the wheel; but when the tiller V is ſhoved to the right, (the perſon who ſhoves it ſtanding between

between the handles) the leaves on the left of the cops will be drawn back at top, conſequently the axle-tree of the wheel Q will be puſhed forward at that end, which twiſts the plough from land; juſt the contrary will be the effect when the tiller V is ſhoved to the left.

"The perforated pieces at the ends of the caps T, T, and ſtand R, are to regulate the height of the wheel to the thickneſs of the furrow, if there are not wheels to ſuit the different depths that the plough may be required to cut; and as wheels for that purpoſe are but little coſt, and not above three would be wanted to anſwer a great variety of depths, I would rather recommend uſing wheels than altering the ſtand R, &c. becauſe it effects the line of traction: and beſides, when wheels are kept to anſwer the different heights, the maſter or his bailiff, by giving out only ſuch wheels as anſwer to the depth the ſeaſon requires, may depend upon having the land ploughed agreeable to his own mind unalterably. The pin, as ſeen at the top of the ſtand R, Fig. 1, is to prevent the ſtand from falling out of the mortiſe, when the plough is weighed up by the handles, to turn upon the friction wheels at the ends of the ridges, &c. The other pin ſuſtains the preſſure of the beam when the plough is in work."

CHAP.

CHAP. XII.

A Deſcription and Explanation of Mr. LLOYD'S HORSE-HOE *and* HARROWS.

FIG. 1. *A perſpective View of the* HOE, *with its* HARROW.

A, THE Share, or Hoe, whoſe out-line forms an angle of 17 degrees; its legs are two feet ten inches and three quarters long, and two inches and three quarters broad at the tail end; their inner edges are one inch thick; their outer edges are ſteel properly hardened, and ground thin, ſo as to cut the roots of the weeds as the Hoe paſſes under the mould; the under ſurface of the Hoe is a little concave; the convexity of the upper ſurface of each leg is equal to a ſegment of one-ſixth part of a circle, whoſe radius is one inch and five-eighths.

B, B, Two Iron Standards, eleven inches and three quarters long, (from ſhoulder to ſhoulder) two inches broad, and one inch thick, inclining to the horizon twenty degrees; their under ends are inſerted into the ſhare, and their upper ends paſs through a croſs beam, or tranſom, to which they are faſtened with iron wedges and waſhers.

D, D,

C, An Iron Sheat, or Brace, one foot three inches and three quarters long, three inches broad, and one inch and a quarter thick, inclining to the horizon twenty degrees; the under end of this Sheat is rivetted to the ſhare; its upper end paſſes through the beam, and is faſtened thereto with an iron wedge and waſher.

D, D, Two Pieces of Plate Iron, (See fig. 2.) one foot nine inches and an half long, from their under edges, five inches and a quarter broad, and about one-twelfth of an inch thick; their fore ends are cut off ſlanting, and rivetted together, diverging towards their back ends, which are faſtened with two iron pins to the two ſtandards B, B, and ſerve occaſionally as a double mould-board to heal or earth up the drills on each ſide of the intervals; but when the hoe is firſt drawn through the intervals, theſe iron wings are taken off, and the angular ſhare or hoe, cuts off the weeds at a proper depth, leaving them on the ſurface of the ground, where they remain till they are ſufficiently withered to prevent them from vegetating; the ſecond going through the intervals, the iron wings are put on, and are uſed to earth up the drills, as before mentioned.

E, A Harrow, with ſeven tines, ſeven inches and an half long, from their ſhoulders to their points, and two inches and a quarter diſtant from each other; the frame of the Harrow is one foot four inches and a quarter ſquare, and its ſhaft (which is faſtened to the ſheat with an iron center pin and feathered bolt) is four feet long, including the Harrow frame; this Harrow is uſed only when the hoe is drawn firſt through the intervals without

the

the iron wings, and ſerves to pulverize the mould, and at the ſame time looſen and eradicate the weeds therefrom.

F, A round-headed Iron Pin, and feathered Bolt, with which the harrow is faſtened to the ſheat C.

G, An Iron Hook, or Brace, which ſerves to ſtrengthen and ſupport the beams and ſheat.

H, A round-headed Iron Pin and Wedges, with which the hook is faſtened to the beam.

I, A Gage Wheel, one foot four inches diameter, and two inches three quarters broad on the periphery.

K, The Iron Gage-Frame, whoſe arms are one foot two inches, and its ſhank two feet four inches and three quarters long, three inches broad, and one inch thick; the ſhank of this frame is perforated with ſmall holes, and paſſing through the beam is faſtened thereto with a round-headed iron pin, and feathered bolt; this Gage ſerves to regulate the depth of the ſhare or hoe in the ground, by moving the iron pin L from one hole in the ſhank to another.

L, An Iron Pin, and feathered Bolt, with which the gage is faſtened to the beam.

M, A round-headed Pin, and Feathered Bolt, which ſerves as an axis for the gage-wheel to turn on.

N, An Iron Wedge, with which the ſhank of the gage-frame is faſtened to the beam, and by taking it out, the ſhank is eaſily moved from one hole to another.

O, An Iron Bridle, faſtened to the beam with a round-headed bolt and wedge.

P, The Chain of the Whipple-Tree.

Q, The

Q, The Beam of the Hoe, is ſeven feet three inches long, from its fore end to the ſhoulder of its tenon, and four inches ſquare at the tail end, tapering off towards the point or fore end, which is two inches and three quarters on all ſides.

R, R, The Handles of the Hoe, whoſe extreme length are four feet ſeven inches and three quarters, and one foot two inches diſtant from each other at their points, or upper ends, and are faſtened together with a wooden trundle; the Handles are faſtened alſo to the beam and wooden ſtandards, with wooden trundles.

S, S, Two Wooden Standards, mortiſed into the croſs beam, or tranſom T.

T, The croſs Beam, or Tranſom, is one foot ſix inches and three quarters long, and three inches and three quarters ſquare; the under end of the beam is mortiſed into the Tranſom, to which the four ſtandards are alſo inſerted as before-mentioned.

A Deſcription and Explanation of Mr. Lloyd's HARROW, *for ſtiff Clay Land.*

Fig. 3. *A perſpective View of the* Harrow.

A, A, A, A, Four curved Shafts, or Ribs, two feet ten inches long, and one inch and three quarters ſquare; each Rib is furniſhed with ſix flat tines, fixed ſix inches diſtant from each other.

L, B, B, B,

B, B, B, Three Rails, or Staves, inſerted into the curved ſhafts, or ribs, and faſtened thereto with wooden trundles; the length of the fore Rail is two feet five inches and a quarter, and the hind Rail is two feet ſeven inches; their breadths are one inch and three quarters, and three quarters of an inch thick.

C, The Bridle and Whipple-Tree, are faſtened with an Iron Bolt to the fore end of the outermoſt ſhaft at the left ſide of the harrow, which is drawn with its ſhafts moving forwards in an oblique direction.

D, The furthermoſt Tine, is fixed in a right line with the bolt of the bridle C, and all the other tines are fixed in ſuch a direction as to make parallel lines to the Tine D.

FIGURE IV.

A View of one of the FLAT TINES.

A, The Tine.

B, The Shank of the Tine, with a mortiſe through its upper end.

C, An Iron Wedge, or Key, which ſerves to faſten the tine to the ſhaft of the harrow.

N. B. It has been found by experience, that a harrow of this conſtruction can be drawn with leſs force than any common harrow of the ſame dimenſions, weight, number of lines, &c. and that it does more effectually cut and pulverize large lumps of ſtiff clay, than any other harrow now in uſe.

A model

A model of this Hoe and Harrow was preſented to the Society by *Richard Lloyd*, Eſq; for which he had the thanks of the Society, *April* 25, 1770.

CHAP. XIII.

A Deſcription and Explanation of Mr. EDGILL's MACHINE *for cutting Chaff.*

FIGURE I.

A, A Steel Plate, or Knife, of a ſpiral form, enlarging its radius, which is two inches and three quarters at the axis, or ſpindle, to ſixteen inches at its point, and about one quarter of an inch thick on the back edge.

B, A Block of Wood, formed nearly of the ſame ſhape as the knife; its thickneſs at the ſpindle is four inches, gradually diminiſhing towards the edge and point of the knife, which is faſtened to the inſide of the Block with flat-headed wood-ſcrews, being firſt let in even with the ſurface of the wood, and the holes in the knife counter-ſunk, ſo as to let in the heads of the ſcrews even with its ſurface.

C, An Iron Spindle, or Axis, two feet two inches long, and ſeven-eighths of an inch in diameter; the knife and block of wood being

being fixed to this ſpindle, revolves with it when the machine is at work. To this ſpindle is fixed alſo the forcer, or ſpiral tooth S, and the ſhort iron lifting-arm X.

D, A circular Fence-Board, two feet ten inches in diameter, with its concentric rim. See K, Fig. 2.

E, A Winch. See Fig. 2.

F, A Trough, wherein the ſtraw or hay is laid to be cut; its length is four feet; the depth ten inches, and breadth ten inches and an half (inſide meaſure.)

G, A Lead Weight. See Fig. 2.

H, A Feeder, or Block of Wood, ten inches long (excluſive of its handle) which projects ten inches over the ſide of the trough, five inches and a quarter broad, and one inch thick: in this block there are fixed five iron ſpikes, or taper tines, whoſe length from their points to the under ſide of the block is ſix inches, and three-eighths of an inch ſquare at their upper ends or ſhoulders: when the ſtraw is properly placed in the trough, this ſpiked feeder is carried back to the end of the trough, and forced with the hand into the ſtraw, which is brought forward at every revolution of the winch E, (Fig. 2.) the length of one tooth of the rack Y; and when the rack is drawn forward, quite to the fore end of the trough, the ſpiked feeder is then to be lifted up, carried back, and forced into the ſtraw, as before-mentioned.

I, An Iron Bolt, one foot five inches long, ſeven-eighths of an inch broad, and three-eighths of an inch thick. This bolt is faſtened with ſcrews to the front of the feeder, and projecting one inch over the ſide of the trough, is connected to the horizontal wooden ſhaft R, with a flat iron plate ſcrewed to its upper edge,

and

and turned up at right angles to the ſaid ſhaft; at the upper end of this plate there is an aperture, or ſquare hole, to receive and direct the iron bolt faſtened to the front of the feeder.

K, A concentric Rim, faſtened to the fence-board D, ſet forth in the explanation of Fig. 2.

L, A bended Iron, which ſuſtains the lead weight, ſet forth more particularly in the explanation of Fig. 2.

M, The Handle of the feeder, which, as before-mentioned, ſerves to lift up, and carry back the feeder H, ſhaft I, and rack R, Y.

N, O, The ends of the concentric Rim K. See Fig. 2.

P, A Carriage Wheel, nineteen inches diameter, and two inches broad on its periphery.

Q, The Stand, or Frame of the Machine: the rails and legs are two inches and an half by one inch and ſeven-eighths; their length from the ground to the bottom of the trough, is two feet ſeven inches.

R, An horizontal Sliding Shaft, made of wood, two feet ſeven inches long, one inch and an half broad, and one inch ſeven-eighths thick.

S, A Spiral Tooth, or Forcer, fixed to the ſpindle about three inches from its extremity: at the under end of this Spiral Tooth, or Forcer, there is a round hole, which, like a ferrel, is driven tight on the ſpindle, and fixed thereto with an iron pin paſſing through the ferrel and ſpindle; the upper end of this Tooth, or Forcer, is a ſmall ſegment of a circle, ſtanding a little oblique to the ſpindle, and paſſing freely through the interſtices of the aſkew teeth of the rack, forcing it forward the length of one tooth of the rack, at every revolution of the winch E.

T, A Wooden Lever, one foot long, two inches and an half broad, and two inches thick, faſtened to the rail of the fence-board D, with an iron pin, key, and waſher; on the under edge of this Lever, (about two inches and three quarters from the inner end) there is a thin plate of iron to prevent the ſhort arm X from wearing the under edge of the Lever.

V, A Rail, or Croſs Brace, one foot ſeven inches long, three quarters of an inch thick, and five inches broad, faſtened to the fence-board.

W, W, Two Poles, with which the machine is conveyed from one place to another.

X, A ſhort Iron Arm, or Riſer, two inches and an half long, half an inch broad, and a quarter of an inch thick; this Arm is faſtened to the ſpindle in the ſame manner as the forcer, or ſpiral tooth S.

Y, An Iron Rack, faſtened with ſcrews to the under edge of the ſliding ſhaft; this Rack is nine inches long, two broad, and one quarter of an inch thick, with thirty-three oblique teeth on its outſide edge.

Z, An Iron Plate, faſtened to the wooden cleat on the ſide of the trough: the ſpindle C paſſes through and turns in this Plate, and is faſtened thereto with an iron key and waſher.

FIGURE II.

A, A Steel Plate, or Knife, of a ſpiral form, ſet forth more particularly in the explanation of Fig. 1.

B, A Block of Wood, formed nearly of the ſame ſhape as the knife. See the explanation, Fig. 1.

C, An Iron Spindle, or Axis, two feet two inches long, and ſeven-eighths in diameter. See Fig. 1.

D, A circular Fence-board, referred to Fig. 1.

E, A Winch, with which the machine is worked; its radius is twelve inches and an half.

F, A Trough, wherein the chaff is laid to be cut. See Fig. 1.

G, A Lead Weight, nine inches and an half long, three inches and an half broad, and two inches and an half thick, weighing about thirty-eight pounds, having in the middle of its upper ſurface an iron ſtaple, by which it is ſuſpended to the curved iron L; and at each end of this weight there is an iron pin, about n inch long, and half an inch diameter. Thoſe pins traverſe up nd down in an aperture cut in each ſide of the trough, and ſerves o keep the weight in a proper direction, as it riſes and falls on the ſtraw, which by this weight is preſſed cloſe together whilſt the knife is cutting it.

H, The Feeder. See the deſcription, Fig. 1.

I, A perpendicular Sliding Bolt, ſcrewed to the feeder, ſet forth in the explanation of it, Fig. 1.

K, A concentric Rim, two inches broad, faſtened to the fore ſide of the circular fence-board, and continued from N to O; this Rim forms a groove which guards the point of the knife, ſo as to prevent it from hurting the perſon who works the machine.

L, A bended Iron, fifteen inches and three quarters long, flatted at one end, and faſtened with four wood-ſcrews to the wooden

wooden lever behind the fence-board; and at its end there is a hook which ſuſtains the lead weight.

M, The Handle of the Feeder H. See the Deſcription of it, Fig. 1.

N, O, The Ends of the concentric Rim, faſtened to the fence-board.

P, The Carriage Wheel, deſcribed in Fig. 1.

Q, The Stand, or Frame of the Machine. See the Explanation, Fig. 1.

W, W, Two Poles, with which the machine is conveyed from one place to another.

The Committee of Mechanics took into conſideration Mr. *Edgill*'s Machine for cutting Chaff;—Reſolved, that the Machine appears to be of a very ſimple and uſeful conſtruction, that the application of its ſpiral cutter ſeems to be new; and that it is the opinion of the Committee that the inventor is deſerving of a bounty of twenty guineas; to which reſolution the Society agreed, *May* 11, 1768.

CHAP.

CHAP. XIV.

A Deſcription and Explanation of Mr. EDGILL'S MACHINE *for ſlicing Turnips, &c. To which are added, ſome Improvements by Mr.* WILLIAM BAILEY.

PLATE 1. FIG. 1. *A perſpective View of the* MACHINE.

PLATE 2. FIG. 2. *A perſpective View of the* STAND, *and internal Part of the* MACHINE.

A, THE Pedeſtal, or Stand, with its kirb, moveable bottom, knives, center-plate, ring, ſpindle, &c.

B, B, Two Ground-Sills, halved together in the middle; their extreme length is four feet ſeven inches; their breadth two inches and a quarter, and thickneſs two inches: at the extremity of each of theſe Sills there is an aperture, with an iron ſcrew, which ſerves to fix the pedeſtal to the floor.

C, C, C, C, Four ſhort Sills, (of the ſame breadth and thickneſs as the ground-ſills B, B) mortiſed into the ſhort braces D, D, D, D, which form a ſquare in the middle of the ſtand.

D, D, D, D, Four ſhort Braces, mortiſed into the principal ſills B, B, &c. their length, excluſive of their tenons, is one foot ſix inches.

E, E, E, E, E, E, E, E, Eight ſhort Poſts, ſeventeen inches long, excluſive of their tenons, and of the ſame breadth and thickneſs as the ground-ſills on which they are erected.

F, F, Two croſs Braces, halved together in the middle, and mortiſed into the four poſts erected on the principal ſills, diſtant from their upper ſides nine inches and a quarter.

G, A circular Kirb, or Rim, three inches and an half broad, one inch and a quarter thick, and three feet ten inches diameter (from out to out); this Kirb, or Rim, is faſtened to the upper ends of the eight poſts with ſtrong iron wood-ſcrews, whoſe heads are let in even with the ſurface of the Kirb.

H, H, H, H, H, H, H, H, Eight Braſs Friction Rollers, one inch and a quarter in diameter, and one inch and an half on its periphery: theſe Rollers are let into the kirb projecting five tenths of an inch above its upper ſurface.

I, I, I, I, Four Scales of Inches, and Parts of Inches, with a hand to each of them to direct how to ſet the machine to ſlice the turnips, &c. of any thickneſs, from two inches to one eighth of an inch.——N. B. The Scales or Indexes are fixed to the kirb, and the hands to the moveable bottom P.

K, K, K, K, Four ſquare flat-headed Screws, five inches and an half long, and one half of an inch thick: theſe Screws paſs through the kirb and moveable bottom of the conic veſſel; the heads of the Screws are let in even with the upper ſide of the kirb, and their winged nuts below ſuſtain the moveable bottom, and ſerve

to

to elevate or depreſs it; by which means the turnips, &c. are ſliced to any degree of thickneſs marked on the ſcales.

L, L, L, L, L, L, L, L, Eight Knives, twenty inches long, and two inches broad; their back edges are three-eighths of an inch thick; their outer ends are let into the kirb, even with its upper ſurface, and faſtened thereto with ſtrong flat-headed wood-ſcrews, between the iron plate M, and the flat iron ring N; the plate M being firſt faſtened with ſcrews to its ſupporter Z. See Fig. 2, and Fig. 4. The knives are ſet in an oblique direction to the central point of the ſpindle; their inner ends being one inch and one-eighth therefrom, and their outer ends at right angles with the ſpindles.——N. B. The under ſide of the knives are bevelled off like a carpenter's chiſſel, but their upper ſides are plain, ſmooth, and truly horizontal.

M, A round Plate of Iron, ten inches in diameter, and one quarter of an inch thick, with a round hole in its center for the ſpindle to paſs through; this plate is faſtened with iron ſcrews to its ſupporter Z, as before-mentioned.

N, A Flat Iron Ring, ten inches in diameter, and one inch and three quarters broad; this plate is pierced with eight holes, which match with the ſcrew holes in the plate M, and the holes in the ends of the knives, between which flat Ring and plate the knives are faſtened with ſcrews, as before-mentioned.

O, An Iron Spindle, three feet four inches long; its upper end is round, from the top down to the plate Z, and from thence to the bottom; it is one inch and a quarter ſquare; to which ſquare part is welded four croſs arms, pierced with holes for wood-ſcrews to faſten the ſpindle to the ground-ſills, the under end of the

Spindle

Spindle paſſing through the center of them. See Fig. 4, Plate 3. There are alſo four other croſs arms welded to the Spindle, and faſtened with wood-ſcrews to the upper ſides of the middle ſtays F, F. See Fig. 4.

P, The moveable Bottom, is three feet ten inches in diameter, and two inches and a quarter thick: this Bed, or Bottom, is ſuſtained by four winged nuts, K, K, K, K, under the kirb G. By theſe winged nuts and ſcrews the moveable Bottom may be ſo elevated or depreſſed, as to ſlice the turnips, carrots, &c. of any thickneſs, from two inches to one-eighth of an inch. In this moveable Bottom there are eight apertures for the ſliced turnips to paſs through; theſe apertures are not cut down perpendicularly, but ſlanting from the cutting edges of the knives, in order to preſerve as much as poſſible the ſubſtance of the wood, and to make way for the ſlices to paſs through freely. The apertures are fifteen inches long, meaſuring from the inſide of the veſſel to the outer edge of the iron ring M: their breadths at their outer ends are two inches and three quarters, tapering as they approach towards the ſaid ring, where they are only one inch and an half broad. The fore edges of the apertures are parallel with the cutting edges of the knives, extending one eighth of an inch before them.

Q, Q, Two feathered Bolts, or Keys; theſe Bolts paſs through the apertures in the ſpindle O; their under edges bearing on two iron rings or waſhers, to prevent the veſſel from riſing from the friction rollers.

FIG.

FIGURE III.

R, A conic Veſſel, three feet four inches and an half in diameter at the bottom, and three feet two inches inſide meaſure at the top; its depth is one foot four inches and three quarters; the thickneſs of the ſtaves one inch and one eighth.

S, A ſquare Block of Wood, ſix by ſix inches on all ſides: this block is fixed in the center of the veſſel with four croſs braces or drivers T, T, T, T. The under ſide of the block is plated with iron, in which there is a hole truly central to the circumference of the veſſel, which the iron ſpindle paſſes through; this hole and the veſſel with its drivers and block revolve round it.

T, T, T, T, Four croſs Braces, or Drivers, eighteen inches and an half long, five inches and a quarter broad, and one inch thick; theſe Drivers are faſtened to the veſſel and block in an oblique direction, inclining to the horizon forty degrees; the outer ends of the Drivers are fitted obliquely into four notches, cut up about an inch and a quarter from the under edge of the veſſel, to which the Drivers are fixed with ſtrong wood-ſcrews: their inner ends are inſerted obliquely into the ſquare block S, to which they are faſtened with nails, or wood-ſcrews.

V, A Croſs Brace, dovetailed into the veſſel, with its upper ſurface three-eighths of an inch below the brim of the veſſel; this Brace is ſix inches broad in the middle, and four inches and an half at the ends; its thickneſs is one inch and a quarter, having an iron plate faſtened to its upper end ſide, with a hole for the ſpindle to paſs through.

W, W,

W, W, Two horizontal Levers: their inner ends are faſtened with hinges ſcrewed to the croſs brace V, diſtant ſix inches from the fixed ſpindle, their outer ends projecting three feet over the brim of the veſſel.

X, X, Two ſtrong Screws, with flat ſemicircular heads, which ſerve occaſionally to faſten the levers to the brace, or to looſen them therefrom when the levers are to be lifted up out of the way, when the machine is not immediately in uſe: this is done by turning the heads of the Screws acroſs the apertures, when they are to be faſtened to the brace; and parallel with the aperture when they are to be taken up.

Y, Y, Y, Y, Four Wood-Screws, or Hooks, ſix inches long, and half an inch thick; their uſe is to faſten the machine to the floor, in the ſame manner as the two levers W, W, are faſtened to the croſs brace V.

Z, A circular Piece of Iron, three inches in diameter, welded to the fixed ſpindle O; this circular Iron ſupports the plate M, to which it is faſtened with four iron ſcrews. See Fig. 2 and 4.

This Machine was invented by Mr. *Edgill*, for which he obtained a premium of 20l. *December* 10, 1766.

There are ſome improvements made to it by Mr. *William Bailey*, for which the Society gave him a bounty of ten guineas, *March* 11, 1767.

N. B. Two men can work this Machine with ſo much eaſe and facility as to ſlice twelve buſhels of turnips in five minutes; which operation it did perform in preſence of the Committee of Agriculture, at the time above-mentioned.

CHAP.

CHAP. XV.

A Deſcription and Explanation of Mr. RUTT'S APPARATUS *for drying Madder. To which is annexed his Obſervations on the Management of it, from the taking it out of the Ground to its being manufactured.*

FIG. 1. *A perſpective View of the* APPARATUS.

A, A Wooden Stage, or Floor, on which are a ſufficient number of hurdles, two or three abreaſt.

B, A Tilt, which is occaſionally drawn over the madder to keep it dry.

C, C, C, C, C, C, C, C, A Rank of Grooves, cut acroſs the upper ſurface of the floor; theſe Grooves ſerve to regulate the intervals between the hurdles, and prevent their feet or under ends from ſliding from their places.

D, D, Two Slips of Wood, faſtened to the floor to prevent the hurdles from ſliding off the ſide of the ſtage, and to regulate the placing them in proper order.

E, E, E, E, E, E, E, E, A Set of Hurdles, put two or three abreaſt, with their feet or under ends placed into the grooves in the ſtage: theſe Hurdles may be ſet to any degree of elevation by altering the length of the triggers or props of the Hurdles.

F, F, &c.

F, F, F, F, F, F, F, F, The Triggers, are ſhort pieces of wood fitted into the apertures in the heads of the hurdles; the upper ends of the Triggers turn on pins, with which they are faſtened to the hurdle, and are occaſionally, for the conveniency of ſtowing away, turned up when the hurdles are not immediately in uſe, and down when the apparatus is put to work.

The following obſervations relative to Madder, together with a very ingenious model of an Apparatus for drying it, was preſented to the Society by the Author, Mr. *George Rutt*; for which he had the thanks of the Society, *May* 11, 1763.

" 1ſt, The proper ſeaſon for taking the roots out of the ground has been uſually thought to be in *September*, and the two following months; but if left till *February*, it is as well for the roots, and far more convenient, for the weather to wind-dry them, which is ſuppoſed to be the beſt method, as *February* and *March* have generally more wind and leſs fogs than the winter months.

" 2d, As drying the freſh roots by fire is expenſive, trials have been made of doing it by the air, or wind, which have ſucceeded very well: to effect this, a method ſhould be taken to place the roots on hurdles (or ſome other convenience) ranged obliquely one behind another in rows, in ſuch a poſition that a current of air might conſtantly blow end-ways through the ſpaces between the hurdles, which ſhould be covered, ſo as to prevent the rain coming upon the madder; and the oftener it is turned, the ſooner it dries, as ſome dirt comes from it every time it is turned;

turned; and it alſo prevents its growing mouldy, which is a great detriment when it ſo happens: but if any perſon chuſes to do it by fire, it ſhould be done with a very gentle heat, and turned often, and ſhould alſo be partly dried by the air (as above) before it is put on the kiln.

" 3d, When it is ſo dry that the largeſt pieces of the root will break ſhort, it ſhould be threſhed, and thereby broke into bits about an inch or two in length, and afterwards thrown over a coarſe corn-ſcreen, or ſifted with a wire ſieve, of about ſix meſhes to an inch; what does not paſs through this ſieve is to be fanned over, to take out the bits of haum, and outſide coat, which breaks off in threſhing; and the ſmall, which paſſes through the above ſieve, is to be ſifted over a fine wire ſieve, to take out the duſt; and what ſtays in the laſt ſieve, together with the light bits that are fanned out, are to be put together, and kept ſeparate from the reſt; the whole may be packed up light in caſks (if they can be procured cheap, and their weight will not add much to the carriage); or cloſe corn ſacks; it is then ready to be ſent to the Machine to be manufactured.

CHAP. XVI.

A Deſcription and Explanation of Mr. EVERS's WINNOWING MACHINE.

PLATE I. FIGURE I.

A, THE Axis of the Fly, is one foot ten inches long, and three-eighths of an inch diameter; on its outer end there is an iron pinion; and at the other end there is a crank, whoſe radius is one inch.

B, B, B, B, B, The Fans of the Fly, (indicated by the dotted lines on the ſide of the cap) are ſixteen inches long, twenty inches broad, and three-eighths of an inch thick: theſe Fans are faſtened to the axis of the Fly A. See Plate 2. Fig. 3.

C, An Iron Pinion, three inches and a quarter in diameter, with twelve teeth on its periphery, which is one inch broad; its iron axis turns in two iron plates faſtened to the ſides of the poſts S, S.

D, An Iron Spur-Wheel, thirteen inches and three quarters in diameter, with ſixty teeth; the breadth of its rim is three quarters of an inch, and its thickneſs five-eighths of an inch.

E, A Winch, whoſe radius is twelve inches.

F, A Hopper, whoſe end is two feet two inches ſquare (inſide meaſure); its under end is thirteen inches and an half, by four and

an

an half; its perpendicular height is one foot one inch and an half.

G, A Wooden Handle, faſtened to a ſliding valve; its uſe is to regulate the diſcharge of corn, by dilating or contracting the aperture at the bottom of the hopper.

H, An Iron Fork, with four prongs; its handle or ſhank bears on the bended iron or fulcrum I, to which it is connected, and ſo looſely rivetted as to move alternately from ſide to ſide: at the extremity of the ſhank there is another iron pin, or ſcrew, which ſerves to confine the ſhank to the wooden trundle Y, which is put in motion by the cranks and crank-rods P, P. See Fig. 3, 4.

I, The Fulcrum, or bended Iron (with a round hole in each end of it); its extreme length is one foot eleven inches; breadth, half an inch; and thickneſs, one quarter of an inch. This iron projects over the ſides of the caſe of the machine; to which it is connected with two round iron pins, whoſe under ends are flatted and ſcrewed to the external ſides of the caſe. See Plate 1, Fig. 1 and 4.

K, A Wooden Roller, which turns in the two front poſts S, S, and is connected to the riddle-box with two ſmall chains, which ſerve to ſet the riddle to a proper degree of inclination for conveying the corn to the under ſcreen or riddle: at the end of this roller there is a wooden ratchet-wheel and ſpring, to fix it when the moveable riddle is properly ſet.

L, A round-headed Iron Pin, which paſſes through the bottom of the hopper to ſuſtain the upper riddle-box, and is the center of its alternate motion. See Fig. 4, Plate 2.

M, The

M, The upper Riddle-Box, is one foot ſeven inches and an half long, one foot ſix inches and an half broad, and eight inches deep (outſide meaſure); this box, with its riddle, fork, fulcrum, &c. are actuated by the fly and crank, as before-mentioned.

N, A fixed Riddle, or Screen, two feet ſix inches long, three feet nine inches and three-eighths broad. See N, Fig. 2.

O, The under moveable Riddle, two feet ſix inches long, and one foot ſeven inches broad, actuated by the crank and rod P. See Fig. 3, Plate 2.

P, P, Two Iron Rods; one of them is three feet; the other, two feet two inches long, and three-eighths of an inch ſquare: theſe Rods are actuated by the crank at the inner end of the axis of the fly A: the upper Rod gives motion to the riddle-box M, and the under Rod to the moveable riddle O, as before-mentioned. See Plate 2, Fig. 3.

Q, A Roller, with two ſmall chains, and a wooden ratchet-wheel at its inner end, with which the under moveable riddle is ſet to a proper degree of inclination.——N. B. A ſpring, made of a thin piece of wood, bears againſt the periphery of this and the ratchet-wheel of the upper roller, to fix them in their places.

R, R, R, R, The Handles of the Machine, with which it is taken up and conveyed from one place to another.

S, S, S, S, Four Poſts, or Standards, to which the caſe of the machine is faſtened: theſe Poſts are four feet eleven inches long, by two inches and an half ſquare.

T, A ſliding Fence-board, two feet two inches long, one foot nine inches and three quarters broad, and three-eighths of an inch thick; to which is faſtened a piece of wood ſixteen inches long,

long, and three quarters of an inch ſquare, with ſixteen notches, cut like the teeth of a ſaw or ratchet-wheel.

V, A Wooden Haſp, or Button, faſtened to one of the front rails of the machine, with a round-headed iron pin; the end of this Haſp ſuſtains the ſliding fence-board, and ſerves occaſionally to ſet it of a proper height, to retain the grain in the upper riddle-box for a time ſufficient to cleanſe it from its huſks, &c.

W, W, A Profile of the Sides of the two under Riddles. See Fig. 2.

X, A round-headed Iron Pin, which ſuſtains the under riddle, and permits it to move alternately from ſide to ſide. See X, Fig. 3.

Y, A Wooden Trundle, faſtened to the ſides of the riddle-box M: to which Trundle the ſhank of the fork is looſely fixed with a round-headed iron pin, as before-mentioned. See Fig. 3, 4.

F I G U R E II.

A Geometrical Plan of the two under Riddles.

W, W, A Geometrical Elevation of the Sides of the Riddles.

X, An Iron Pin, with a round head at its upper end, and a mortiſe or hole to receive a feathered bolt in its under end, with which the riddle O is connected to riddle N.

F I G U R E III.

A, A Wooden Axis, to which the fans of the fly are faſtened.

B, B, &c.

B, B, B, B, B, The Fans of the Fly. See the deſcription, Fig. 1.

C, An Iron Pinion. See the deſcription, Fig. 1.

D, An Iron Spur-Wheel. See Fig. 1.

E, The Winch.

F, The Hopper.

G, The Handle of the ſide Valve.

K, A Wooden Roller, with its ratchet-wheel and chains, to which the riddle-box is ſuſpended: this Roller is twenty-three inches and a quarter long, and one inch in diameter; the ratchet-wheel is three inches and a quarter in diameter, and one inch on its periphery: this ratchet-wheel is let into the ſide of the poſt, even with its ſurface.

M, The upper Riddle-Box.

N, The fixed Riddle.

O, The under Riddle: theſe Riddles are indicated by the dotted lines on the ſide of the caſe, Fig. 1.

P, P, The Crank Rods.

O, The Roller and Ratchet-Wheel, &c. of the under Riddle: this Roller, &c. is of the ſame dimenſions as the roller K.

R, R, The Handles of the Machine.

S, S, S, S, The four Poſts, or Frame of the Machine.

X, The Iron Center-Pin which ſuſtains the under riddle.

FIGURE IV.

F, The Hopper.

H, The Fork.

I, The Fulcrum, or bended Iron.

K, The upper Roller, with its ratchet-wheel and chains.

L, The round-headed Iron, to which the riddles, riddle-box, &c. are ſuſpended.

M, The Riddle-Box.

Y, The Trundle; ſet forth more particularly in the deſcription of Plate 1.

This Machine was purchaſed of Mr. *Evers*, *January* 14, 1761.

CHAP. XVII.

A Deſcription of the Model of Mr. EVERS's WIND-MILL *for threſhing and grinding Corn; made to a Scale of an Inch and an half to a Foot.*

PLATE 1, FIG. 1. *A Geometrical Plan of the* MILL.

A, THE Ground Floor, is two feet ſquare, inſide meaſure, and one foot nine inches and three quarters high.

B, B, &c.

B, B, B, B, B, B, B, B, Eight ſhort Poſts or Blocks of Wood, three inches and three quarters long, and one inch and a quarter broad, and half an inch thick. Theſe Poſts are faſtened to the ground-floor, to ſupport the moveable threſhing-floor, which turns very ſlowly on friction rollers inſerted into the heads of the Poſts.

C, A circular Threſhing-Floor, two feet in diameter, and one inch and ſeven-eighths broad, on its periphery, in which there are one hundred and forty-eight cogs: the corn is laid on this Floor with its ſtraw, or ſtalks, in a concentric direction, and threſhed with the perpendicular ſtampers L.

D, The perpendicular Axis of the Threſhing-Floor, ſupported on a column, whoſe height from its plinth to the top of its capital, is ten inches and three-eighths. Its under gudgeon works in a block of wood faſtened on the ground-floor; and its upper gudgeon turns in the beam or girder which ſuſtains the mill-ſtones O, &c.

E, An Iron Pinion, one inch and an half in diameter, with ſix teeth. This Pinion turns the large ſpur wheel or threſhing-floor C.

F, A Spur-Wheel, two inches and five-eighths in diameter, with fourteen teeth connected to the ſpur-wheel G.

G, A Spur-Wheel, one inch and ſeven-eighths in diameter, with eight cogs.

H, A Crown-Wheel, three inches and one-fourth in diameter, with eighteen cogs, actuated by the ſpur-wheel I.

I, A Spur-Wheel, three inches and three quarters in diameter, with nineteen cogs; this Wheel is faſtened to the outer end of the barrel, and revolves with it.

K, A hollow Wooden Cylinder, eight inches and three-eighths in diameter, and eight inches broad, on its periphery, on which there are fixed a ſet of ſtuds or friction-rollers in a ſpiral direction, equidiſtant from each other. Theſe ſtuds or lifting rollers being thus diſpoſed, they lift up the ſtampers, or flails L, in ſucceſſive order as the Cylinder revolves.

L, Twelve Stampers, or Flails, fourteen inches long, and one-third of an inch ſquare, ſet equidiſtant from each other, and properly fitted to embrace the friction-rollers on the cylinder, as they paſs in rotation; for which purpoſe there are mortiſes or notches cut in the rails f, f, in which the ſtampers move looſely up and down, when they are actuated by the ſtuds or friction-rollers. The feet of the ſtampers are two feet broad, ſtraight on their bearings or under ends, and curved on the upper part of the feet, as repreſented in Fig. 2. where is ſeen alſo, an iron ſocket or ſhoe, faſtened to the ſtamper, and properly fitted to lay hold of the friction-roller on the cylinder.

M, A vertical Crown-Wheel, faſtened to the inner end of the cylinder: this Wheel is nine inches in diameter, with fifty cogs, connected to the horizontal crown-wheel N.

N, An horizontal Crown-Wheel, four inches and an half in diameter, with twenty cogs: this Wheel is faſtened to the main ſhaft Z, and gives motion to the cylinder, and the whole train connected thereto.

O, A Pair of Stones for grinding Corn, eight inches and three quarters in diameter, and two inches and one eighth thick, each ſtone.

P, A Lantern-Wheel, two inches and an half in diameter, with twenty-one trundles.

Q, An horizontal Spur-Wheel, ten inches in diameter, with ſixty cogs: this wheel gives motion to the mill-ſtones O, and lantern-wheel P, on the ſame ſpindle.

R, A Crown-Wheel, ſeven inches and an half in diameter, with forty cogs.

S, A Crown-Wheel, eight inches and an half in diameter, with forty cogs: this Wheel is faſtened to the wind-ſhaft, the firſt mover of the train.

T, T, T, T, The Vanes, or Sails, two feet five inches and an half long, and one foot broad, faſtened to the wind-ſhaft in the uſual manner.

U, A large Wooden Weather-cock, which ſerves to turn the ſails to the wind.

V, The Collar-Beam, or Plat Form of the Roof, twenty-two inches, by ſeventeen, in diameter.

W, The Friction-Roller Frame, ſeventeen inches and a quarter in diameter, and half an inch thick.

X, X, &c. The Friction-Rollers, three quarters of an inch in diameter at their outer ends.

Y, The Hypotenuſe, or fixed Collar-Beam, ſeventeen inches and three quarters diameter, and one inch and an half thick.

Z, The main Shaft, two feet nine inches and three quarters long, two inches and an half in diameter at the bottom, and one inch and an half at its upper end.

a, a, a, a, a, a, a, a, Eight Poſts, framed together in the form of an octagon ſpire, whoſe height, from its platform to its fixed collar-beam, is two feet three inches and an half.

b, b, The Gallery, which goes round the ſpiral part of the mill.

c, c, &c. The Studs, or Rollers, three quarters of an inch in diameter, and five-eighths of an inch broad on the periphery.

d, d, &c. Iron Shoes, or Sockets, faſtened to the ſtampers: their toes projecting three quarters of an inch therefrom, embrace the ſtuds on the cylinder, and are by them lifted up as before-mentioned.

e, e, e, e, e, e, e, e, e, e, e, e, Twelve Tillers, or ſhort pieces of Wood, which are made uſe of to fix and regulate the ſprings.

f, f, Two directing Rails. On the ſide of each of theſe Rails there is faſtened a piece of wood, with notches, or mortiſes, in which the ſtampers are inſerted and move looſely up and down, when actuated by the ſtuds on the cylinder.

g, A Rail, notched in the ſame manner as the rails which guide the ſtampers. This Rail contains the tillers e, e, &c. and ſerves to ſet and regulate the ends of the ſprings of a proper height, to keep the ſtampers from bearing on the ſtraw.

h, A Rail, in which the ends of the ſprings are faſtened.

i, A thin Plate of Iron, faſtened to the rail h, and pierced through with holes for the ends of the ſprings k, k, which in the model are made of ſteel wire, or comb-broaches; but in the machine itſelf they are made of fir, aſh, or any other ſtraight wooden poles.

k, A Set of Springs, made of ſteel wire, or woolcombers broaches; their points paſs through the apertures in the ſtampers. See Fig. 3.

l, The

l, The Wind-Shaft, is ſeventeen inches long, an inch and one-eighth in diameter, at the outer end, and three quarters of an inch at the inner end, and ſet to an angle of twelve degrees.

FIGURE II.

A ſide View of one of the STAMPERS, *with its Iron Shoe.*

d, The Iron Shoe, or Socket, faſtened to the ſhank of the ſtamper L.

FIGURE III.

A view of the edge of the ſtamper L, in which is ſeen part of the ſhoe d, and the aperture k, in which the points of the ſteel wires paſs through.

PLATE II. FIG. IV.

A, The Ground-Floor.

B, The Blocks and Friction-Rollers, on which the threſhing floor revolves.

C, The Threſhing-Floor, with its ſpur-wheel.

D, The Column, or Shaft of the Threſhing-Floor; this column is not ſeen in this view of the mill. See Fig. 1.

E, The Spur-Wheel, which gives motion to the ſpur-wheel C.

F, A Spur-Wheel, on the ſame ſpindle as the wheel E.

G, The

G, The Spur-Wheel, which gives motion to the wheel F.

H, A Crown-Wheel, on the ſame ſpindle as the wheel G.

I, A Spur-Wheel, faſtened to the axis of the hollow cylinder.

K, The hollow Cylinder, with its ſtuds or friction-rollers, &c.

L, The Stampers.

M, A vertical Crown-Wheel.

N, An horizontal Crown-Wheel.

k, The Steel Springs, or Comb broaches. Theſe Springs in their full magnitude are made of fir, or aſh poles.

b, b, The Galleries, which go round the mill.

P, A Lantern-Wheel, not ſeen in this view of the mill.

Q, The horizontal Spur-Wheel, which gives motion to the mill-ſtones.

R, A Crown-Wheel, actuated by the crown-wheel S.

S, A Crown-Wheel, faſtened to the wind-ſhaft.

T, The Whips, or Arms of the Vanes.

V, The Collar-Beam.

U, The Weather-cock.

W, The Friction-Roller Frame.

X, X, &c. The Friction-Rollers.

Y, The fixed Collar-Beam.

Z, The Main Shaft.

FIGURE V.

W, A Plan of the Friction-Roller and Frame.

X, X, &c. A Set of Friction-Rollers.

PLATE

PLATE III. FIG. VI.

A Plan of the GROUND-FLOOR, THRESHING-FLOOR, CYLINDER, &c.

A, The Framing of the Ground-Floor.

C, The Threſhing-Floor.

H, A Crown-Wheel, on the ſame ſpindle as the wheel G.

I, A Spur-Wheel, faſtened to the axis of the hollow cylinder.

K, The hollow Cylinder, with its ſtuds c, c, &c.

O, The Mill-Stones.

P, A Lantern-Wheel, on the ſame ſpindle as the mill-ſtones.

Q, The Spur-Wheel, which gives motion to the lantern-wheel P.

FIGURE VII.

A perſpective View of the GROUND-FLOOR, THRESHING-FLOOR, *and the Movements contained thereon.*

A, The Ground-Floor.

B, B, &c. The Blocks, with their friction-rollers.

C, The Threſhing-Floor.

D, The

D, The Shaft of the Threſhing-Floor.

E, The Lantern-Wheel, which gives motion to the ſpur-wheel on the threſhing floor.

F, A Lantern-Wheel, on the ſame ſpindle as the wheel E.

G, A Spur-Wheel, connected to the wheel F.

H, A Crown-Wheel, on the ſame ſpindle as the wheel G.

I, A Spur-Wheel, on the axis of the hollow cylinder.

K, The hollow Cylinder, with its ſtuds, or rollers c, c, &c.

L, The Stampers.

f, f, The Guide-Rails of the Stampers.

d, d, &c The Shoes of the Stampers.

k, The Steel Springs, or, in the model, Fir-Poles at large.

e, e, &c. The Tillers, which regulate the ſprings.

g, The Rail, to which the tillers are faſtened.

h, The Rail, to which the ſprings are faſtened.

i, A thin Plate of Iron, nailed to the rail for the ends of the ſprings to paſs through.

This Mill was invented by Mr. *William Evers*, of *Swillington*, near *Leeds*, in *Yorkſhire*, who erected one of his new conſtructed Mills in its full magnitude, for Mr. *John Turton*, farmer, at *Wragby*, in the ſaid county, where it worked in preſence of many reſpectable gentlemen, farmers, and others, who ſigned a certificate of their approbation of the utility of the machine. A model of it, made to a ſcale of an inch and an half to a foot, was produced to the Society by Mr. *Evers*; for which he had a bounty of fifty pounds, and the further ſum of ten guineas for his model, which was depoſited in the Society's Repoſitory of Agriculture, *February*, 3d, 1768.

CHAP.

CHAP. XVIII.

A Deſcription and Explanation of Mr. EDGEWORTH'S PERAMBULATOR.

FIG. 1. *A Plan of the* MACHINE.

A, THE Nave of the Perambulator, is made of two circular pieces of wood, eight inches in diameter, and one inch thick. On the ſide of one of them, there are eleven concentric grooves; the other has only a plain, ſmooth ſurface, which is laid over the grooves, and faſtened thereto with three ſcrews and nuts.

B, B, B, The Screws and Nuts, with which the grooved and the plain part of the nave are faſtened together.

C, A ſquare hole in the center of the nave, into which the axis G is inſerted, and faſtened with the ſcrew and nut I.

D, D, D, D, D, D, D, D, D, D, D, Eleven Spokes, one inch ſquare at their nave ends, which are driven tight into the grooves or mortiſes in the nave: the points of the Spokes are rounded off, about two inches from their extremities, and capped with braſs, to prevent them from gulling or wearing: this ſtock of Spokes, or wheel without fellies, is exactly one pole in circumference, and may be eaſily rendered portable, by unſcrewing the ſides of the nave, &c.

E, A

E, A Line, or Cord, tied from one ſpoke to the other, to ſteady and regulate their diſtance from point to point.

F, F, F, F, F, F, F, F, F, F, F, Eleven Braſs Caps, faſtened to the ſpokes, to prevent them from wearing, &c.

FIGURE II.

A Profile of the MACHINE.

A, The Nave.

D, D, D, D, D, D, D, D, D, D, D, Eleven Spokes.

F, F, F, F, F, F, F, F, F, F, F, Eleven Braſs Caps, or Ferrils, faſtened to the ends of the ſpokes.

G, A round Iron Axis, or Cylinder, circumſcribed with a ſpiral line or thread, conſiſting of a certain number of circumvolutions on its ſurface. Its length (in its full magnitude) is two feet eight inches and a quarter, and ſeven-twelfths of an inch in diameter: its upper and under ſides are filed off flat, ſo as to form a narrow fillet or margin, from one end of the axis to the other; on which is engraved an index, to ſhew the number of poles, furlongs, and miles, the perambulator has paſſed over: the index on one ſide of the axis ſhews the degrees from the right hand to the left: the degrees on the other ſide are marked and reckoned from the left to the right; and when the nut H has fully performed its retrograde motion, by paſſing from the nave to the extremity of the axis, and back again, the machine will have meaſured out exactly two miles: the axis is held, and turns round, in the hands of the perſon who uſes it, whilſt the wheel rolls on the ground.

As the number of revolutions which the wheel makes exactly

correſpond with the ſpiral threads on the axis or ſcrew-rod, the thicker thoſe threads are, the larger and more conſpicuous will be the degrees on the index.

H, A Braſs Nut or female ſcrew, two inches and an half long, one inch and a quarter broad, and three quarters of an inch thick; this nut hangs like a pendulum, on the axis or ſcrew-rod G, but does not turn round with it, being kept in a perpendicular poſition, with its center of gravity below its center of ſuſpenſion, gradually advancing or receding on the axis, and pointing to the index marked thereon; which index ſhews how many revolutions the wheel has made, and the number of miles, furlongs, poles, &c. it has paſſed over.

I, A Screw and Nut, with which the axis is faſtened to the nave.

FIGURE III.

A View of the Axis, *with its Index*, &c.

G, The Axis, or Screw-Rod.

H, The Braſs Nut.

I, The Screw, with which the axis is faſtened to the nave A.

This Perambulator was tried in the King's private road near *Pimlico*, in preſence of the Committee of mechanics, who was of opinion, that it is cheap, ſimple, more portable and commodious in its uſes, and accurate in its operations, than the common Perambulator.

The Committee recommended the ſilver medal of the Society to be given to *Richard Lovel Edgeworth*, Eſq; for his ingenuity, and laying the ſame open to the public; to which the Society agreed *April* 8, 1767.

CHAP.

CHAP. XIX.

A Deſcription and Explanation of Mr. CHRISTOPHER SAVERLAND'S MACHINE *for levelling Land; taken from a Model made to a Scale of one Inch to a Foot.*

FIG. 1. *A perſpective View of the* MACHINE.

A, THE Thill, or Shafts of the Carriage, are eight feet two inches long.

B, B, The fore Carriage-Wheels, are three feet diameter.

C, The Axle-tree of the fore Carriage, is three feet eight inches long, one foot one inch broad, and five inches thick.

D, The Tranſom and Bed of the fore Carriage, is three feet ſeven inches long, ſeven inches broad, and five inches thick; faſtened together with two iron bolts, and an iron ſway-bar.

E, The Sway-bar Frame.

F, A curved Pole, five feet two inches long, eight inches broad, and ſix inches and an half thick, at its inner end, which is halved and dowelled to the fore rails G, Y.

G, The front Rail of the hind Carriage-Frame, is three feet five inches long, (from ſhoulder to ſhoulder) ten inches broad, and five inches thick.

H, H, Two Sills, nine feet three inches long, ten inches broad, and five inches thick; their fore ends are elevated, being

cut

cut up to an angle of thirty degrees, in order to bring the line of traction nearly parallel to the breaſt of the horſe: theſe Sills are framed together with the three croſs rails G, Y, Y.

I, I, I, I, Four Braces, two feet nine inches long, three inches and an half broad, and two inches thick; theſe braces are mortiſed into the ſills H, H, and faſtened with wood-ſcrews to the two poſts K, K.

K, K, Two flat Poſts, two feet eleven inches and an half long, from ſhoulder to ſhoulder, ten inches broad, and three inches and an half thick; their under ends are mortiſed into the ſills, five feet ten inches diſtant from their back ends; and their upper ends into the tranſom or croſs rail L. In the under ends of each of theſe Poſts, there is an aperture or long mortiſe, to receive the ſhort ſliding-blocks V, V. See Fig. 1 and 4.

L, The Tranſom, or croſs Rail, is four feet ten inches long, ten inches broad, and three inches thick; this Rail projects about four inches over the poſts, in order to be taken off and on the more readily, whenever the axis, arms, handles, &c. of the ſtoppers M, N, O, P, want to be repaired or altered.

M, M, The Arms of the Stoppers, are thirteen inches long, ſeven inches and three quarters broad, and two inches and an half thick. In the under edge of theſe Arms there are two angular teeth, or notches, like the teeth of a ratchet-wheel; theſe teeth fall looſely into the ſquare holes in the upper end of the ſhovel or pan Z, and occaſionally ſtops it, when the workman preſſes down the handle O, P, &c.

N, The Wooden Axis of the Stopper, whoſe pivots turn in the upper ends of the flat poſts H, H.

O, A round Rail, or Handle, with which the ſtoppers or notched arms are preſſed down into the ſquare holes in the upper end of the ſhovel Z.

P, P, Two Trundles, one foot five inches long, and one inch and an half in diameter, with which the under rail is connected to the handle, or upper rail O.

Q, The under Rail of the Stopper, is two feet eleven inches long, four inches broad, and three inches thick; this Rail, with the trundles and handles, are faſtened to the Stopper or notched arms, as repreſented in Fig. 1, 3.

R, R, The hind Wheels, are one foot five inches in diameter, and three inches thick on their periphery.

S, The Plancere, or Floor, is three feet nine inches, by four feet three inches, on which the man ſtands to work the machine.

T, The Wooden Bar, which ſupports the ſhovel, is four feet three inches long, ſeven inches broad, and three inches thick; its tenons paſs looſely through the long mortiſes in the ſides of the ſills, and are occaſionally fixed with wooden wedges nearer or further from the ſhovel, to regulate its angle of inclination.

U, U, Two Iron Frames, or Quadrants, partly indicated by the dotted lines on the ſide of the ſill; theſe quadrants are welded to the ends of the iron axis X, and faſtened with wood-ſcrews to the ſides of the ſhovel Z, and may eaſily be ſet further or nearer to the point of the ſhovel, as ſhall be found moſt convenient to throw the weight of earth nearer or further the center of its motion.

V, V, Two Wooden Blocks, ſeven inches long, and four inches

inches ſquare; their ends are indented, and properly fitted to the pivots of the iron axis X, which they embrace in the manner repreſented in Fig. 1 and 3. The ſides of theſe Blocks are rabbeted, and properly fitted to the apertures in the poſts K, K, in which they move freely up and down, and are fixed to a proper height by the iron pins ſhewn at X, by which the ſhovel is ſet deeper or ſhallower into the ground, and eaſily moved on its axis in loading and unloading.

W, A Wooden Shovel, whoſe bottom is two feet five inches and an half ſquare, inſide meaſure, and about two inches thick; its under end is ſhod with ſteel; its upper end Z, is a piece of board, three feet long, thirteen inches broad, and two inches thick, faſtened at right angles to the bottom, to which the angular ſides are alſo faſtened, as repreſented in Fig. 2.——N. B. This ſhovel contains about one garden-cart full of earth.

X, The Iron Axis of the Shovel, is three feet five inches long, from ſhoulder to ſhoulder, and one inch and an half ſquare. The pivots of this axis turn in the two ſhort blocks V, V, which are raiſed or depreſſed by ſhifting the iron pins, as before-mentioned.

Y, Y, Two Rails, three feet five inches long, (inſide meaſure) eight inches broad, and four inches thick, mortiſed into the ſills H, H.

Z, The upper End of the Shovel, is a piece of board three feet long, thirteen inches broad, and two inches thick, as before-mentioned; at each end of this board, there are three ſquare holes, to which the teeth or notches of the arms M, M, are looſely fitted, and occaſionally inſerted to keep the ſhovel in a proper poſition.

FIG.

FIGURE II.

U, U, Two Iron Frames, or Quadrants, faſtened to the iron axis, and the ſides of the ſhovel.

X, The Iron Axis, to which the ſhovel is hung.

Z The upper End of the Shovel, in which there are ſquare holes to receive the notches or teeth of the arms M, M.

FIGURE III.

M, M, The notched Arms, or Stoppers.

N, The Wooden Axis of the Stoppers.

O, The hand Rail of the Stoppers.

P, P, Two Trundles, with which the handle, or upper and under rails are faſtened together.

Q, The under Rail of the Handle-frame, halved and faſtened to the notched arms M, M.

FIGURE IV.

V, V, X, The Sliding Blocks, whoſe ſides are rabbeted, and properly fitted to the apertures K, K, and their end to the pivots of the axis X.

A model

A model of this Machine was ſent to the Society the twenty-ſecond of *April*, 1771, and referred to the Committee of Agriculture and Mechanics jointly, who examined it with great accuracy; but as the model is very ſmall, (being made to a ſcale of one inch to a foot) they thought it adviſeable not to give their opinion of it till they had ſeen the Machine in its full magnitude. Accordingly they appointed a time for the inſpection of the Machine at *Watford*, in *Hertfordſhire*, where a very reſpectable committee met, and minutely examined it; had it worked in their preſence, and with great facility it filled up a large pit in a ploughed field belonging to Lord *Hyde*, whoſe ſervants had ſucceſsfully uſed it for ſome time paſt. This operation was performed to the ſatisfaction of the committee, who was of opinion, that the machine equals in work the labour of twenty men; and that Mr. *Chriſtopher Saverland* is deſerving of the gold medal of the Society; to which the Society agreed, *June* 5, 1771.

CHAP.

CHAP. XX.

A Deſcription and Explanation of a Pyramidical BEE-HIVE, *preſented to the Society by Sir* CHARLES WHITWORTH, *one of the Society's worthy Vice Preſidents.*

FIG. 1. *A perſpective View of the* HIVE, *fixed to a Wooden Poſt, or Pillar, in the Ground.*

A, A Poſt, or Pillar, driven into the ground, of a depth ſufficient to ſupport and ſecure the hives from being ſhocked or overturned by ſtormy winds, &c. its upper end is about two feet from the ground, and properly ſhaped, to ſuſtain a large ſquare board, whereon the hives are placed.

B, A Piece of Board, about two feet ſquare, and two inches thick; in the middle of this Board there is a ſquare hole, or mortiſe, into which the head of the poſt A is inſerted, and well faſtened with wedges, nails, or wood-ſcrews: by this method of fixing the floor, the bees are much better ſecured from mice, and other vermin, than when they are placed on a frame, or ſtand, with four legs, &c.

C, An Octagon Bee-Box, one foot two inches in diameter, and ten inches high, with glaſs windows and window-ſhutters, which may be occaſionally opened, as repreſented in this Box, where the ſhutters are taken off to ſee the working of the bees; this Box

is placed on the floor B, and is properly luted thereto, leaving ſufficient room for a landing-place for the bees on the front or fore edge of the floor. On the top of the Box there is a ſquare hole, covered with the ſliding valve, or wooden ſhutter, four inches broad, which is occaſionally drawn out to make way for the bees to go up into the ſtraw hive, when for want of room they are about to ſwarm, and fly off, which by this contrivance is entirely prevented, and the lives of the bees preſerved.

D, A Straw Hive, ſomewhat flatter on the top than common ſtraw hives; where there is alſo a hole covered with a ſliding valve, which opens a communication between the ſtraw and the glaſs hive, for the purpoſe before mentioned.

E, A Glaſs Hive, eight inches and an half in diameter at the baſe, and ten inches and an half high, with a braſs handle fixed on its apex.

F, A Braſs Handle, faſtened to the head of the hive, with which it is occaſionally lifted up to take out the honey and wax.

G, A round Stick, or Slip of Wood, about an inch in diameter, fixed in a perpendicular poſition in the center of the hive, to which is faſtened another Stick of about the ſame dimenſions, extending horizontally from one ſide of the hive to the other; theſe Sticks ſerve to ſupport and ſteady the loaded combs, and prevent them from breaking with their own weight, or by any accidental ſhock, &c.

H, A Braſs or Tin Sliding-Valve, eleven inches long, and four inches broad.

I, I, I, I, Four Glaſs Windows, with ſhutters, which are taken off

off occaſionally to ſee the working of the bees, as repreſented in this view of the octagon hive.

K, A Wooden Sliding Valve, ten inches long, four inches broad, and a quarter of an inch thick; when the bees are like to ſwarm, theſe Valves, as before-mentioned, are to be drawn out to make way for them to go up into the hive above, which they will readily do without ſwarming, or flying off; and at night, when the new and old ſwarms are both quiet in their hives, the communication between the two hives is to be ſhut up, by thruſting the Valve into its place.

L, An Aperture, three inches long, and three-eighths of an inch broad, through which the bees enter into their new habitation.

M, M, Two Braſs Handles, by which the hive is lifted up from the floor.

CHAP. XXI.

A Deſcription and Explanation of the BRABANT *and* HAINAULT REAPING-SCYTHES *and* STAFF-HOOK, *preſented to the Society by* WILLIAM HANBURY, *Eſq; June* 1, 1763.

FIG. 2. *A perſpective View of the* BRABANT-SCYTHE.

A, THE Blade of this Scythe, is two feet ten inches long, and three inches and an half broad at the heel.

B, An

B, An Iron Ring or Ferril, and Wedge, with which the ſcythe is faſtened to the ſnead.

C, The Snead, or Handle, is three feet ſeven inches long, having a crutch head, which is placed under the right arm of the reaper when he uſes the ſcythe.

D, A Slip of Leather, ſixteen inches long, and one inch broad; one end of it is nailed to the ſnead, the other has a ſlit or loop in the end of it; for the reaper to put his thumb into; which done, he wraps the ſlip of leather round his hand, the better to ſecure and ſteady the ſcythe.

E, The Graſp, or Handle, is faſtened to the ſnead with an iron wedge, and an iron ferril, whoſe ſhank paſſes through the Graſp, and is rivetted to the end of it.

F, A curved Piece of Wood, faſtened to the end of the ſnead, which is placed like a crutch under the right arm of the reaper, and ſerves as a fulcrum, or center of motion of the ſcythe; the reapers uſe this ſcythe with the crutch-head under the right arm, and a ſtaff-hook, like the Hainault hook in the left hand.

FIGURE III.

A perſpective View of the HAINAULT REAPING-SCYTHE.

A, The Blade, is one foot eight inches long, and its extreme breadth is three inches, gradually diminiſhing towards its point and heel; its back edge, from the extremity of its breadth to its point, forms a curve nearly to a fourth part of a circle, whoſe radius is five inches; the blade of this ſcythe is not flat like other ſcythes,

ſcythes, its under ſide being turned up rounding, eſpecially towards its heel, where its back edge is ſet up, ſo much as to ſhape its upper ſurface almoſt as hollow as a common table-ſpoon.

B, An Iron Ferril and Wedge, with which the ſcythe is faſtened to the ſnead.

C, The Snead of this Scythe, is two feet two inches long, one inch and an half broad, and one inch and a quarter thick, at its under end.

D, A Slip of Leather, or Loop, faſtened to the upper end of the ſnead for the purpoſe before-mentioned.

FIGURE IV.

A perſpective View of the STAFF-HOOK.

A, The Staff of the Hook, is four feet long, and about an inch broad, by one inch thick; it is uſed with the left hand to collect the corn in ſuch ſmall parcels as the reaper's ſtrength or dexterity can cut off at a ſtroke, with the ſcythe in his right hand, which alternately follows the motion of the Staff-Hook in his left.

B, A round Iron Hook, whoſe back edge forms a curve, which is part of a circle, whoſe radius is five inches; its ſhank or butt-end is ſplit and laid open, to embrace the end of the ſtaff, and is ſhaped like a wedge, and inſerted into the ſplit end of the Hook, which is faſtened with iron rivets to the ſtaff.

C, The Mortiſe in the End of the Staff, is of no other uſe than to paſs a leather ſtrap or cord through, when the ſtaff-hook,

ſcythe,

ſcythe, &c. is to be tied up in a bundle to be carried on the reaper's ſhoulders.

D, A Leather Loop, faſtened to the ſtaff, for the fingers of the left hand to paſs through, to ſteady the hand, and to keep the graſp at a proper diſtance from the ground.

END OF BOOK I.

BOOK II.

OF

AGRICULTURE;

COMPREHENDING

A ſhort Account of ſuch of the Ploughs, Machines, and Models, in the Society's Repoſitory of Agriculture, as are not yet delineated.

CHAP. I.

A ſhort Deſcription of Mr. CLARKE'S DRAIN-PLOUGH.

THIS Plough, with ſeveral others, were tried on *Epping-Foreſt*, in preſence of the Committee of Agriculture. Theſe Ploughs were all intended to cut a drain one foot deep, twenty inches wide at top, and ten at bottom; the ſides equally ſloping, the earth raiſed and delivered on the ſurface of the ground

at

at each ſide of the drain. The Ploughs were firſt tried with ſix horſes, but as the ground was very ſtiff, and a little ſtoney at the bottom, their ſtrength was not ſufficient to overcome the reſiſtance; it was therefore reſolved, to add two more horſes to the team, which alſo proved ineffectual, for the reaſon before-mentioned. The Committee therefore appointed another time and place where the ground was more proper for the experiment. Accordingly a ſecond trial was made on ouzy ground, where the ploughs before-mentioned were worked with eight horſes, and performed to the ſatisfaction of the Committee, and many others, who were of opinion, Mr. *Clarke*'s Plough was preferable to the Ploughs of the other candidates; in conſequence of which the Committee Reſolved, That Mr. *Clarke* was intitled to the premium of fifty pounds; to which the Society agreed, *October* 8, 1766.

The beam of this Plough is eight feet long, ſix inches broad, and three inches and three quarters thick at the tail end, tapering from the ſheat to its fore end, which is mortiſed into the middle of a tranſom, or croſs rail, to which it is faſtened with a ſquare iron bolt and wedge. At each ſide of the beam there is a ſquare ſhaft, curved and tapered in the ſame manner as the beam. The fore ends of theſe ſhafts are mortiſed into the tranſom, or croſs rail, at the fore part of the plough; their back ends extending about four feet therefrom, are faſtened together with a bar, or ſlip of wood, and two trundles, which paſs through the ſhafts and the beam; the diſtance of the ſhafts from each other, is two feet two inches from out to out. There is a roller or gage fixed to the fore end of the plough, to regulate the depth of the drain; this

roller

roller is eleven inches in diameter, and twenty inches broad on its periphery. At each end, and in the middle of the roller, there is a comb, or thin plate of iron, faſtened thereto with wood-ſcrews. Theſe plates are three inches larger in diameter than the roller, and are intended to cut the ground before the coulters, which are ſuppoſed to follow in the ſame tracts. This roller turns in two angular iron frames faſtened to the under ſides of the two ſhafts, connected to the beam as before-mentioned. The under ends of the three coulters are inſerted into the angular points of the ſhare; the upper ends of the two ſide coulters are faſtened to the ſhafts, and the upper end of the middle coulter is inſerted into the beam, and faſtened thereto with wedges. The extreme width of the ſhare is ten inches; the length of the Plough from the point of the ſhare to the tail-end of the ground-reſt, is three feet ſix inches.

N. B. The ingenious inventor of this Plough, having diſcovered ſome improvements which for a trifling expence might be added to this uſeful inſtrument, took the firſt opportunity to make another Drain-Plough, on the ſame principle as the former; to which are added the following improvements, viz.

The gage or roller of this Plough is of the ſame dimenſions as the former, but has only one comb, or iron plate, which is fixed in the middle of its periphery, projecting three inches beyond its ſurface; the iron frame which contains it is connected to a quadrant or ſegment of a circle, pierced with holes, which ſerve to elevate or depreſs the roller; by which means the depth of the drain is partly regulated, and the point of the ſhare ſet in a proper direction.

The other improvement is in the double mould-board, which, in the original Plough, is permanently fixed to the beam, ground-reſt, &c. but in this the inventor has contrived two moveable blocks of wood, which at pleaſure may be ſet higher or lower on the mould-board, to which they are ſo judiciouſly ſhaped and fitted as to turn and deliver the earth as it riſes on the mould-board, (which is an inclined plane, whoſe expanſion encreaſes with its elevation) by which means the Plough may in a few minutes be ſet to make trenches of divers breadths and depths.

This Plough the Society purchaſed of Mr. *Cuthpert Clarke*, *June* 8, 1767.

CHAP. II.

A Short Deſcription of a LAND-ROLLER, *taken from a Model made to a Scale of Four Inches to a Foot; preſented to the Society by* JAMES SCAWEN, *Eſq; Auguſt* 13, 1767.

THIS Roller is divided into three equal parts, or Rollers, each of them eight inches long, and ſix inches and a quarter in diameter. Each Roller turns on a ſeparate axis, in two diſtinct frames, which are formed and connected as under-mentioned; the fore frame is one foot ſquare, and contains one diviſion of the Rollers, whoſe axis turns in two ſemicircular cheeks mortiſed into the under ſide of the frame; at whoſe inner end there is a ſemicircular piece of wood, or ſway-bar, mortiſed into the ſides of the frame, to which the thill or ſhafts for the horſe are faſtened as uſual with an horizontal iron bolt. The hind

hind frame is two feet by one, from out to out, and contains two diviſions of the Roller, which turn in three ſemicircular cheeks, mortiſed into this frame in the ſame manner as the cheeks of the other frame. The two Rollers contained in this frame are fixed in a ſtraight line with each other, leaving an interval of three inches between them, and are five inches and an half diſtant from the fore Roller, when they are ſet truly parallel to each other. Theſe frames and Rollers are connected by a perpendicular iron bolt, which paſſes through the frames, &c. and is the center of the ſway-bar's motion, when the fore frame with its Roller turns to the right or left.

CHAP. III.

A ſhort Deſcription of M. DE CHATEAU VEAUX's SINGLE CULTIVATOR.

THE beam of this Cultivator is nine feet ſix inches long, including the two detached ſhafts framed thereto, and to which the carriage-wheel is faſtened; the wheel is two feet ten inches in diameter, and two inches broad on its periphery. This inſtrument is held and directed with two forked handles, mortiſed into the end of the beam. The ſhare is eighteen inches and an half long, including its point, which is nine inches and a quarter long, and two inches broad, having an angular creſt on its upper ſurface. Its extreme width at the heel, is eleven inches and an half; to which is welded a perpendicular ſhank, eight inches and

an

an half long, with an horizontal arm ſeven inches in length, at whoſe extremity there is a perpendicular return about two inches long. This ſhort return is inſerted into a hole in the under ſide of the beam, in which there is alſo a groove, or channel cut, to receive the horizontal arm, which is let in even with the ſurface of the beam, and faſtened thereto with a ſtrong iron ferril and wedge. At the fore ends of the two detached ſhafts or beams, there are two iron hooks or ſtaples to which the horſe is faſtened.

CHAP. IV.

A ſhort Deſcription of Mr. DE CHATEAU VEAUX'S DOUBLE CULTIVATOR, *for looſening the Earth, and deſtroying Weeds in the Alleys between the Drills.*

THIS inſtrument is made with two ſhares, exactly on the ſame conſtruction as the ſingle cultivator; but the manner of fixing them is very different. The ſhare of the ſingle cultivator is faſtened to the beam, but the ſhares of this cultivator are detached from the beam, and faſtened to two ſquare ſhafts, framed to the beam with two ſlips, or flat pieces of wood, mortiſed into the beam, and each of the ſhafts. The two ſlips are pierced with holes for the conveniency of ſetting the ſhafts with their

their ſhares, wider or cloſer to the beam, according to the diſtance of the two intervals from each other.

The ſhares are faſtened to the detached ſhafts with iron ferrils and wedges, in the ſame manner as the ſhare of the ſingle cultivator. The forked handles are alſo faſtened to the beam in the ſame manner as the handles of the ſingle cultivator.

The carriage wheel is two feet ten inches in diameter, and two inches on its periphery, as before-mentioned. Its nave or axis, is one foot eight inches and an half long, and five inches and an half in diameter. In the middle it turns on two iron gudgeons, inſerted into the detached ſhafts, framed and properly faſtened to the beam, in the ſame manner as the ſhafts of the ſhares are. There is an iron hook faſtened to the fore end of each of thoſe ſhafts, to which the traces are linked for the horſe to draw by.

N. B. Theſe cultivators were procured by M. *De Chateau-Veaux*, at the Society's expence. The maker of them, in order to render them as cheap as poſſible, has ſo contrived the carriage-wheel, and the two fore ſhafts, as to fit either the ſingle or the double cultivator; but as the frequent putting the ſlips, &c. in and out of the mortiſes, is apt to looſen and injure the inſtrument, many people are of opinion, that it would be better to have a wheel and ſhafts, &c. fitted to each inſtrument.

CHAP.

CHAP. V.

A ſhort Deſcription of Mr. CHARLES LLOYD'S CYDER-MILL, *taken from a Model, made to a Scale of One Inch to a Foot.*

THIS model is a fruſtrum of a cone, conſtructed nearly on the ſame principle as a common coffee-mill, but has the nut and ſhell made of ſtone, inſtead of ſteel, and the ribs, or teeth, are made nearly in the ſame ſpiral form as the teeth of a common ſteel-mill, but much larger, and not ſo thin on their cutting edges. The ſhell, or concave part, is three inches in diameter at its baſe, and one inch at its vertex. Its perpendicular height is about four inches. This ſhell is permanently fixed on its baſe to the floor, and is at all times in a ſtate of reſt; whilſt the nut, or convex part is actuated by the firſt mover, which is an horizontal crown wheel, ſeven inches and three quarters in diameter, with one hundred and ſixteen cogs. This wheel gives motion to an horizontal ſhaft, on which there are two vertical crown-wheels, one of them four inches in diameter, with forty-eight cogs, actuated by the large horizontal crown-wheel, the firſt mover; and the other, whoſe diameter is five inches and three-quarters, with ſixty-ſix cogs, is connected to a perpendicular trundle, or wallower with eleven rounds, whoſe ſpindle paſſes through the nut, or ſolid cone, to which it is faſtened with wedges through the ſpindle. The horizontal crown-wheel, or firſt-mover, is fixed

fixed to a perpendicular ſhaft, to which there are three horizontal ſhafts, whoſe radius is eight inches, and their height from the ground is parallel with the breaſt of middle ſized horſes, which is the power made uſe of to work this mill. The apples are put into a hopper fixed over the vertex of the ſhell, or hollow cone, where they are ground, and diſcharged at its baſe upon a large tub, covered with hair-cloth: the juice iſſuing therefrom, being ſtrained through it, is conveyed off into a veſſel properly placed to receive it, and the pulp removed to the preſs to be ſqueezed by the combined powers mentioned in the deſcription of the cyder-preſs.

The model of this mill and Cyder-preſs were purchaſed of Mr. *Lloyd*, for the ſum of twenty guineas, *March* 25, 1761.

CHAP. VI.

A ſhort Deſcription of Mr. LLOYD'S CYDER-PRESS, *taken from a Model made to a Scale of Two Inches to a Foot.*

THIS machine expreſſes the juice from the pulp of the apples, by means of a beam, or lever, which, according to the model, is twenty one inches long, one inch and a quarter broad, three quarters of an inch thick at its back, or fulcrum end, and three quarters of an inch ſquare at its point or fore end; to which is hung a weight, or weights, ſufficient for the purpoſe intended. The inventor of this machine thinks this method of expreſſing the juice

juice from the apples, preferable to the ſcrew-preſs, which gradually looſes its effect as the juice oozes from the pulp; whereas the lever and weight follow the pulp, or cheeſe, as ſome people call it, as it diminiſhes in bulk, and preſſes it at all times with equal force: the lever, &c. is taken up and down as occaſion requires, by means of a windlaſs, pawl and pullies, very handy, and judiciouſly fixed for that purpoſe. At the inner end of the preſs, there is a poſt ten inches and a quarter long, two inches broad, and one inch and three-eighths thick; in the middle of this poſt there is an aperture or mortiſe four inches long, and half an inch broad; through which is inſerted a ſtrong tenon, cut in the end of the lever; this tenon is occaſionally moved higher or lower in the aperture, according to the height of the cheeſe or pulp. At the fore end of the preſs there are two poſts, ſix inches and three quarters long, half an inch broad, and a quarter of an inch thick, diſtant from each other one inch and an half; their upper ends are mortiſed into a tranſom, or piece of wood, three inches long, five-eighths of an inch broad, and a quarter of an inch thick, to which there is a pulley properly fixed for taking the lever up and down, as before-mentioned: theſe poſts ſerve to direct the fore end of the lever, as it moves up and down; and alſo as a fixture for the windlaſs, and ſome other parts of the preſs.

The inventor of this preſs thinks this method of expreſſing the juice from the apples, preferable to the ſcrew-preſs, which gradually loſes its effect, as the juice oozes from the pulp; whereas the lever and weight follow the pulp, (or cheeſe, as ſome people call it) as it diminiſhes in bulk, and preſſes it at all times with equal force.

CHAP. VII.

A short Description of an APPARATUS, *or Temporary Covering for Stacks of Corn, Hay, Wood,* &c. *taken from a Model made to a Scale of Two Inches to a Foot; presented to the Society by* RICHARD LOVEL EDGEWORTH, *Esq;*

THIS Apparatus is constructed much on the same principle as an umbrella: its stem or pole is two feet long, and five-eighths of an inch in diameter: its upper end is made into a screw, about thirteen inches long, to which is fitted a wooden nut, two inches in diameter, and half an inch thick: on the upper side of this nut there are eight iron pins, fixed equi-distant from each other, and are used to hook the lines over when the arms of the machine are expanded, &c. There is another nut of the same dimensions as that before-mentioned, which is also fitted to the screw part of the stem: these nuts are framed together with eight wooden bars, five inches and an half long, half an inch broad, and one-eighth of an inch thick; the under or last-mentioned nut, is circumscribed with an iron ring, or piece of wire, let into a groove in the edge of the nut, in which nut there are eight notches, about one eighth of an inch broad each. The concentric ends of the eight arms before-mentioned, are inserted into these notches, in which they occasionally turn freely up and down on the wire or ring let into the groove for that purpose.

Theſe arms are one foot three inches long, one quarter of an inch broad, and one-eighth of an inch thick; the outer ends of the arms are fixed at equal diſtances, by a cord tied from one arm to the other, and by a piece of painted canvas faſtened thereto to keep the rain from the corn, &c. The ſmooth end of the ſtem, or pole, is inſerted into the ſtack of corn, or hay, to ſecure it from ſtorms of wind, &c.

CHAP. VIII.

A ſhort Deſcription of the Rev. Mr. GAINSBOROUGH'S DRILL-PLOUGH.

THIS Plough makes three drills, ſows and covers at the ſame time: it conſiſts of the following parts and movements, viz. three taper binns, or hoppers: theſe hoppers are filled with corn or ſeed, which is conveyed into three triangular trunks, whoſe under ends are ſhod with iron, properly ſhaped to make the trenches, or drills; the points or under ends of the trunks may be ſet to make the trenches or drills deeper or ſhallower in the ground, by moving occaſionally three iron pins, properly fitted for that purpoſe; the plough is built on three ſills, four feet long; the middle ſill is ſix inches broad, and five inches thick; the two ſide ſills are alſo ſix inches broad, but only three inches

inches thick; these sills are fixed equi-distant from each other, extending two feet three inches from out to out, and fastened together with two traverses, or cross rails, mortised through the sills. This plough moves on three carriage wheels, made of wood, eight inches and a quarter in diameter, and two inches thick on the periphery; the fore wheel is fastened to the end of the middle sill; and the two others, to the back ends of the side sills. There are also two iron wheels fixed to the sides of the Plough, which roll on the ground to give motion to the three small wooden rollers hereafter mentioned. The wheels are two feet two inches in diameter, and a quarter of an inch on the periphery; the axis of these wheels passes through, and gives motion to three small grooved rollers, fitted into the mouths, or upper ends of the trunks; on which rollers, the corn is received, and as it were numbered into the throat of the trunks, from whence it is conveyed into the drills, and properly covered with a harrow fitted for that purpose.

This Drill-Plough, with several others, were tried in a ploughed field at *Brompton*, in presence of the Committee of Agriculture, who resolved that the premium of fifty pounds, offered for the best Drill-Plough, should be divided as follows, between the two candidates, the Rev. Mr. Gainsborough and Mr. Willey: to the former, 30l. to the latter 20l. to which the Society agreed, *May* 14, 1766.

CHAP.

CHAP. IX.

A ſhort Deſcription of Mr. WILLEY'S DRILL-PLOUGH, *with One Wheel.*

THE frame of this Plough is ſeven feet two inches and an half long, (including its handles) and two feet eight inches broad, from out to out.

The carriage wheel is three feet two inches in diameter, and two inches and a quarter broad on its periphery; its axis is made of wood, to which is fixed a wherrer, or pulley, with an angular groove, in which there is a band or cord connected to another wherrer, which wherrer is faſtened to the iron axis of the ſeed-box. This ſeed-box is two feet one inch long, and twelve inches and an half diameter, with a partition in the middle to make it anſwer the purpoſe of two ſeparate ſeed-boxes, which drop the ſeed or grain into two taper trunks, whoſe points or under ends are ſhod with iron properly ſhaped to make the trenches or drills for the corn, &c. Theſe trunks are occaſionally ſet at a greater or leſs diſtance from each other, by two iron ſcrews fixed for that purpoſe in the ſide rails of the carriage frame; the fore ends of theſe rails are connected with the thill or ſhafts, and their back ends, being rounded off and properly ſhaped, are the handles by which the Plough is held and directed. There is a traverſe, or croſs

brace,

brace, at the back part of the frame, which is four inches broad, and three inches thick, having two long mortiſes cut through them, in which are inſerted two ſtaves, which extend to the ground, and ſerve (when properly ſet, with wooden wedges made for that purpoſe) to cover the corn in the drills.

This Plough was made by Mr. *Willey*, the inventor of the Drill-Plough, repreſented in Plate 1, and 2, page 35; and as the Plough he deſcribed is leſs complicated and much cheaper than the other, it was recommended to the Society on that account; but moſt people are of opinion, that the firſt Plough is preferable to the Plough above-mentioned; which was purchaſed by the Society, *June* 24, 1767.

CHAP. X.

A ſhort Deſcription of Mr. BESTLAND'S DRILL, *taken from a Model, made to a Scale of an Inch and an Half to a Foot.*

THIS Drill moves on three carriage-wheels; the fore-wheel is two inches in diameter, and half an inch broad on its periphery: it turns in a flat iron frame, with a round ſhank, which paſſes through, and turns in a round hole in the fore end of

of the beam. The two hind wheels are one inch and a quarter in diameter, and three-eighths of an inch broad on their peripheries. The axle-trees of theſe wheels are each ſeven inches and a quarter long, and half an inch ſquare. There are two tongues, or thin ſlips of wood, five inches long, half an inch broad, and one-eighth of an inch thick, mortiſed into the ends of this axle-tree, which, with the wheels, &c. are connected to the triangular frames with hinges, and two iron pins through a double rank of holes in the tongues or ſlips before-mentioned. The fore end of the beam is ſuſpended on the ſhoulders, or upper ends of the iron frame of the fore carriage-wheel. The back end of the beam branches off into two curved arms, extending eight inches from their ſhoulder, and are ten inches diſtant from each other at their extremities. The length of the fore end, or ſtraight part of the beam, is eight inches from its point to its ſhoulder. On the curved arms of the beam there are two triangular frames, one over the other, in an inclined direction. Their under ends turn on hinges fixed to a traverſe, or croſs rail, at the tail of the drill; by which means their points or upper ends are eaſily elevated, or depreſſed, by moving an iron pin in a quadrant, or ſegment of a circle, which paſſes through a mortiſe in the upper ends of the ſaid frames. By this contrivance, the ſhares, which are faſtened to theſe frames, are ſet deeper or ſhallower in the ground at pleaſure.

This inſtrument has nine ſhares, five whereof are faſtened to the bars of the upper triangular frame, and four to the under frame; the former are fixed behind the latter, and ſtirs the ground in the intervals between the ſhares of the latter. There is an

iron

iron ſtaple and hook rivetted to the iron frame of the fore carriage wheel, to which the cattle are faſtened to work the Drill.

This machine for making cloſe drills was invented by Mr. *Nathaniel Beſtland*, for which he had a bounty of ten guineas, *February* 23, 1769.

The following Obſervations on Drill Huſbandry was made by Mr. *Beſtland*, and ſent with his Model to the Society.

" If land is properly prepared and drilled, it will be ſeeded with half a buſhel in an acre leſs than in the common hill country way. By its being let down upon ſuch a firm bottom, it ſtrikes a ſtronger root, and its lying low in the ground makes no great ſhew in the winter; but in the ſpring it recovers its colour, and carries its proof fuller to the harveſt, and is better preſerved from the birds at the time of ſowing. I always make uſe of it as a drag to prepare the land, and find it to anſwer better than any I ever tried before.

" This manner of preparing the land ſome time before it is ſowed, often ſets thoſe weeds a growing to which it is moſt ſubject, and when theſe weeds are up, the drilling and harrowing, when the wheat is ſowed, will certainly deſtroy them, and in a great meaſure preſerve the whole crop.

" Four horſes can draw this inſtrument, but it is uſual to drive five, as they can draw it over ſeven acres in a day."

CHAP.

CHAP. XI.

A ſhort Deſcription of Mr. JOHN WINN BAKER'S SCARIFICATOR, *preſented to the Society,* April 7, 1767.

THE carriage-wheel of this inſtrument is two feet eight inches diameter, and two inches broad on its periphery; its axis or ſpindle turns in two ſliding pieces of wood, fitted to the ſhafts of the carriage-frame; theſe ſliders ſerve to ſet the wheel higher or lower, by which means the coulters enter deeper or ſhallower into the ground at will.

The machine conſiſts of two parts. 1ſt, The wheel and carriage-frame. 2d, The beam with its coulters, &c. The whole joined together is eight feet one inch long; its fore part contains the carriage-wheel fixed to two ſliders, as beforementioned; its back part contains the beam, with its ſide pieces, &c. in which are fixed five coulters, ſo placed as to form an angle of ſeventy-five degrees; the four foremoſt coulters are fixed two a-breaſt, converging as they approach towards the fifth or ſingle coulter, fixed in the angular point at the tail end of the beam, and in a ſtraight line with the carriage-wheel, diſtant from the foremoſt coulters one foot eleven inches; the coulters thus fixed, cut parallel gaſhes in the ground two inches three quarters diſtant from each other, and by means of the ſliders and wedges beforementioned,

tioned, may be ſet to any depth required from one to five inches: the handles of this inſtrument are faſtened to the ſides of the beam; which beam is four feet ten inches long, and three inches ſquare: on each ſide of the beam there is firmly faſtened a thick piece of wood, wherein there are four mortiſes pierced for the four foremoſt coulters, which are faſtened thereto with wooden wedges: the beam extends nineteen inches from the fore ends of theſe ſide pieces, and is faſtened to the carriage-frame with two croſs bars: this frame conſiſts of two ſquare ſhafts and three croſs bars; the foremoſt bar is fourteen inches long, four inches broad, and one inch and a quarter thick: this bar is mortiſed into the fore ends of the two ſhafts, leaving ſufficient room for the carriage wheel to move freely in the interval between the head of the beam, and the ſaid bar; in the middle of it there is a hole for an iron link and hook, to which the cattle are faſtened: the two other bars are fourteen inches long, three inches broad, and one inch thick: theſe bars paſs through the fore ends of the beam, and the back ends of the ſhafts of the carriage frame, by which the fore and back parts of the inſtrument are connected, and properly fitted for the purpoſe intended.

CHAP. XII.

A ſhort Deſcription of a HAND-DRILL, *for Garden-Seeds, invented by* JOHN ARBUTHNOT, *Eſq; and preſented to the Society, May* 4, 1769.

THIS Drill is made of a forked ſtem or pole, whoſe prongs or arms are flatted, and properly ſhaped, to comprehend a wheel, fixed to a wooden axis, which turns in two round holes in the ends of the ſaid arms, each of which is ſixteen inches long, three inches and an half broad, and one inch and an half thick. The ſtem, or pole, from its point, or extremity, to the ſhoulder of its arms, is three feet five inches long, and three inches and an half in diameter. The ſtem is ſlit or ſawed through from end to end, and divided into two equal parts, for the convenience of putting in and taking out the carriage-wheel, with its axis, &c. and faſtened together again with four wooden pegs, and a wooden trundle, which paſſes through the end of the ſtem, and ſerves as a handle to work the drill with.

The wheel is one foot in diameter, and two inches and an half broad on its periphery. The axis is two feet ſix inches long, and one inch and a quarter ſquare in the middle, and round from the inſides of the arms to its extreme ends; on each of which is fixed a ſmall leg, or barrel, eight inches long, and ſix in diameter, pierced with holes of different ſizes, according to the ſort of grain

or

or ſeed to be ſown; and ſuch holes as are not in immediate uſe, are ſtopped with corks. Theſe barrels, being fixed to the axis, turn with the carriage-wheel, and drop their contents in ranks on the ground, which contents are covered as the drill goes on with a rake or harrow, properly fitted for that purpoſe, and hung to the round part of the axis: the arms of the harrow, thus connected to the axis, are one foot nine inches long, an inch and an half broad, and one inch thick.

CHAP. XIII.

A ſhort Deſcription of a MODEL *of a* MACHINE *for drawing up Trees by the Roots; preſented to the Society by* RODOLPH VALTRAVERS, *Eſq;*

THIS Machine conſiſts of two ſtandard poſts, each three inches ſquare, with an interval of three inches between them; the poſts are faſtened together at top and bottom by two croſs pieces; the pins are one inch and a quarter diameter, and the holes one inch and an half in diameter; the foot of the ſtandard muſt be reſted on ſome flat piece of wood, or ſtone, and abutted with ſtakes or little piles driven into the ground. The ſecond part of the machine is a ram, made of elm, or any other ſtraight grained wood, leaſt liable to ſplit, bend, or give way.

The

The head of the ram is armed with a ſtrong piece of iron divided into three points, in order to bite againſt the tree: the ſtandard of the ram is eight inches by ſix, when ſquared, and divided into two legs, from the bottom up to the firſt iron ferril or clamp, in which there is a pulley of four inches thick, and nine inches in diameter; the reſt of the aperture, from the firſt to the ſecond clamp, is fitted and joined again by a wedge, ſo that the remainder of the ram is ſolid: this ram, with its pulley, is ſuſtained with a chain about ten feet long; the links of which are four inches and ten-twelfths of an inch in length: this chain paſſing through the legs of the ram, is faſtened by one end to the top of the ſtandard poſt; the other part of the chain paſſes under the pulley, and its other extremity terminates in a link with two handles, to which the hook is faſtened. Through the ſubſtance of each of the legs of the ram, there are two iron bands, which, with an iron roller paſſing through their other extremities, embrace the two ſtandard poſts in ſuch a manner, that while the ram is ſliding up and down, its baſe is ſecured from flying away from the ſtandard.

The third part is the crook, the whole of which, with its arm and little arch, is made of iron; the arm above the crook is two inches thick, gradually diminiſhing towards the arch, which is but a quarter of an inch thick; the handle of the lever is bound with rings, forked near the crook, and divided by a groove pierced with holes, in order to ſtop the hole with iron pegs, as occaſion requires. Six or eight men can manage this machine with great eaſe; one to move the lever pins, three to the lever, and three or four to work a windlaſs, with a rope faſtened to the top of the tree to direct its fall.

BOOK III.

CHAP. I.

A LIST of the Noblemen and Gentlemen, who for their eminent Services have been preſented with the Society's Gold Medal.

TO the late Right Hon. Jacob Lord Viſcount Folkſtone, Preſident of the Society for Arts, Manufactures, &c. - - - a gold medal.

To the Right Hon. Robert Lord Romney, Vice-Preſident, now Preſident, - - - a gold medal.

To Sir Charles Whitworth, V. P. - - a gold medal.

To Edward Hooper, Eſq; V. P. - - a gold medal.

To the late George Eckerſall, Eſq; V. P. - a gold medal.

To William Fitzherbert, Eſq; V. P. - - a gold medal.

To Henry Baker, Eſq. - - - a gold medal.

To Charles Stewart, Eſq. - - - a gold medal.

To Mr. William Shipley, - - - a gold medal.

A Liſt

CHAP. II.

A List of the Authors who have obtained Honorary Premiums for Treatises on the Culture of WHEAT, BARLEY, LUCERN, TURNIPS, *&c.*

1766. TO Sir Digby Legard, of Ganton, Yorkshire, Bart. for an account of the most profitable manner of cultivating Barley; } a gold medal.

To the Rev. Mr. Lowther, Rector of Aikten, near Carlisle, Cumberland, for an account of the most profitable method of cultivating Wheat; } a gold medal.

To William Taylor, Esq. of Cannon-hill Surry, for an account of the most profitable method of cultivating Lucern; } a gold medal.

To Mr. John Willey, of South Petherton, in Somersetshire, for an account of the most profitable method of cultivating Turnips; } a gold medal.

1767. To Christopher Baldwin, Esq. of Clapham-common, Surry, for an account of the most profitable method of cultivating Lucern; } a gold medal.

To Matthew Cox, Esq. of Walhampton, near Lymington, Hants, for an account of the most profitable method of cultivating Wheat; } a gold medal.

To

To Robert Colville, Eſq. of Newton, near Wisbich, in the Iſle of Ely, Cambridgeſhire, for his account and cultivation of Turnip-Cabbage; } a ſilver medal.

1768. To Robert Barber, Eſq. at Gover, near Exeter, for promoting the Views of the Society with reſpect to his introducing the culture of Burnet, as an article of Huſbandry; } a gold medal.

1769. To Arthur Young, Eſq. of North-Mims, Hertfordſhire, for culture of Cole-ſeed; } a gold medal.

To Mr. Philpot Chambers, for his account of cultivating Turnips with Beans; } a ſilver medal.

1770. To Mr. Jeſſard Minſter, in the iſle of Thanet, Kent, for his obſervation on the Turnip-rooted Cabbage; } a ſilver medal.

To the Rev. Mr. Davies Lamb, M. A. for his obſervation on Timothy Graſs, Burnet, and Turnip-rooted Cabbage; } a ſilver medal.

CHAP.

CHAP. III.

Honorary Premiums for ſowing ACORNS.

		Acres.	Medals.
1758.	TO his Grace the Duke of Beaufort, for ſowing - -	23	a gold medal.
1759.	To Dennis Rolle, Eſq. for ſowing	23	a gold medal.
	To Philip Carteret Webb, Eſq. for ſowing	21	a ſilver medal.
	To Mr. John Romey,		a ſilver medal.
	To Mr. Thomas Drew, for ſowing	10	a ſilver medal.
	To Mr. John Berney, for ſowing	5	a ſilver medal.
1762.	To Edward, Earl Winterton, for ſowing - - - -	20	a gold medal.
	To his Grace the Duke of Bedford, for ſowing - - - -	11	a ſilver medal.
1763.	To George Forſter Tuffnell, Eſq.		a gold medal.
1764.	To John Buxton, Eſq. of Ruſhford, Norfolk, for ſowing - -	22	a gold medal.
1766.	To Blunden Moore, Eſq. of Byfleet, Surry, for ſowing - - -	37	a gold medal.

Honorary Premiums for planting SCOTCH FIRS.

	Plants.	Medals.
1761. TO Robert Fenwick, Eſq. of Limington, Norfolk, -	104000	a gold medal.
To Dennis Rolle, Eſq. for planting	100394	a gold medal.
To Robert Sutton, Eſq. for planting	24000	a ſilver medal.
To Matthew Lee, Eſq. for planting	6000	a ſilver medal.
1763. To Francis Trotman, Eſq. for planting - - -	30000	a gold medal.
To Thomas Batchelor, Eſq. for planting	16000	a ſilver medal.
To his Grace the Duke of Bedford, for planting - - -	16000	a ſilver medal.
1764. To Robert Fenwick, Eſq. of Limington, for planting —	104000	a gold medal.
To John Mount, Eſq. of Waſhing, Berks, for planting - -	14000	a ſilver medal.
1765. To Robert Fenwick, Eſq. for planting — —	102000	a gold medal.
1766. To ditto, for planting -	100000	a gold medal.
To the Hon. Lord Scarſdale, for planting	18000	a ſilver medal.
1767. To John Wright, Eſq. of Lombard-ſtreet, for planting —	46000	a gold medal.
1769. To William Beckford, Eſq. of Font-hill, for planting —	610800	a gold medal.
To Matthew Barnes, Eſq. of Wilton, near Norwich, —		a ſilver medal.

Honorary

Honorary Premiums for planting CHESNUTS.

	Acres.	Medals.
1763. TO John Freeman, Eſq. of Shute Lodge, for planting	2	a gold medal.
To George Forſter Tuffnell, Eſq. for planting — —	5	a gold medal.

	Plants.	
1767. To Lord Viſcount Turner, for planting - - -	12000	a gold medal.
To Edward Jacob, Eſq. of Nackington, for planting - - -	9000	a gold medal.

Honorary Premiums for Small Leaved Engliſh ELMS.

	Plants.	Medals.
1763. To the Earl of Portſmouth, for planting - - -	6000	a gold medal.
1765. To William Earle, Eſq. of Malmsbury, for planting -	14900	a gold medal.
1766. To John Freeman, Eſq. of Shute Lodge, for planting —	2140	a gold medal.
1767. To Edward, Earl Winterton, for planting — — -	2000	a gold medal.

CHAP.

CHAP. IV.

Honorary and Pecuniary Premiums given for planting MADDER.

TO John Arbuthnot, Eſq. of Mitcham, for planting ſixteen acres of madder, in the pariſh of Morden, Surry, } a gold medal.

	£.
1755. To Mr. Thorp, for raiſing and curing twenty pounds weight of good madder, - - - -	30
1758. To Mr. Nicholas Criſp, of Bow Church-yard, for producing the largeſt roots of three years growth, twenty in number, - - - -	20
To Mr. Samuel Shaw, for producing the largeſt roots of one years growth, twenty in number, - - -	10
To Mr. John Roſe, for producing the largeſt roots of two years growth, twenty in number, - -	10
To Mr. Suter, for producing the largeſt roots of one year's growth, twenty in number, - - -	8
1759. To Mr. Samuel Shaw, for planting the beſt of two years growth, - - - -	20
To Mr. John Suter, of Barnes, Surry, for ditto, -	16
To ditto, for ditto, of one year's growth, - -	10
To Mr. Brounton, a ſecond premium, for ditto -	8

The

The following Perſons received Five Pounds per Acre, for planting MADDER.

	Acres.	£.	s.
To Mr. William Kemp, for planting -	10	50	0
To John Cooke, Eſq; of Tandridge, Surry, for planting - - - -	1	5	0
To Mr. William Cox, for planting -	9	45	0
To William Trevilian, Eſq; for planting -	1	5	0
To Mr. William Wilcocks, for planting -	3	15	0
To Mr. John Goddard, of Ditchling, Suſſex, for planting - - - -	1	5	0
To Meſſ. Kemp and Lane, Teynham, Kent, for planting - - -	29	145	0
To Mr. William Fairman, for planting -	1	5	0
To Mr. John Thorp, of Thames Ditton, for planting - - -	4½	22	10
To the Rev. Mr. John Baber, of Great Cheſterford, for planting - - - -	3	15	0
To Mr. John Simmons, of Preſton, Kent, for planting - - - -	1	5	0
To Mr. John Harriſon, of Preſton, Kent, for planting - - - -	1	5	0

To

	Acres.	£.	s.
To William Hutchens, Eſq; of Barns, Surry, for planting - - - - -	10	50	0
To Meſſ. Humphreys and Vinal, for planting	1	5	0
To the Rev. Mr. John Peele, Tilney, Norfolk, for planting - - - - -	1	5	0
To Mr. William Pickering, for planting -	1	5	0
To Mr. James Cole, of Ditchingham, Norfolk, for planting - - - - -	3 1/4	16	5
To Mr. Daniel Colgate, for planting -	1	5	0
To Mr. Francis Harris, Iver, Bucks, for planting	1	5	0
To Mr. Joſeph Mace, for planting - -	2	10	0
To George Forſter Tuffnell, Eſq; for planting	6	30	0
1764. To Mr. John Ranſom, of Stow Market, for planting - - - - -	1 1/2	7	10
To Mr. * *Gabriel Curner*, of North Matford, Devon, for planting - - - - -	10	50	0
To Meſſ. Abraham Preble, and Joſhua Royle, of St. Marys, Northgate, Canterbury, for planting	15	75	0
To Meſſ. Lane and Kemp, of Teynham, Kent, for planting - - - -	7	35	0
To Jacob Pattiſon, Eſq. of Whittam, Eſſex, for planting - - -	1	5	0
To Mr. William Goſſe, of Ringwood, Hampſhire, for planting - - -	2	10	0
To the Rev. Mr. John Peele of Tilney, Norfolk, for planting - - - - -	1	5	0

To

* Paid to Dr. John Stephens.

	Acres.	£.	s.
To Mr. James Cole, of Ditchingham, Norfolk, for planting - - -	1	5	0
To Mr. Francis Harris, of Iver, Bucks, for planting - - - - -	1	5	0
To Mr. John Ranſom, of Stow Market, for planting	2	10	0
To Mr. Joſeph Flight, of Batterſea, Surry, for planting - - - - -	3	15	0
To Mr. John Flight, of Thames Ditton, for planting - - - - -	2	10	0
To William Hutchings, Eſq. of Barnes Elms, Surry, for planting - - -	2	10	0
To Edward Buckworth Herne, Eſq. of Heverland, Norfolk, for planting - -	2	10	0
To Mr. John Simmons, of Preſton, Kent, for planting - - - -	2	10	0
To Mr. Francis Crump, of Batterſea, Surry, for planting - - - - -	3	15	0
To Mr. Francis Butein, of Burchington, in the Iſle of Thanet, for planting - - -	1	5	0
1765. To Mr. Francis Crump, of Batterſea, Surry, for planting - - -	1	5	0
To Arthur Young, Eſq. of Bradfield, Suffolk, for planting - - - -	1	5	0
To the Rev. Mr. John Peele, of Tilney, Norfolk, for planting - - - -	1	5	0
To Mr. John Simmons, of Preſton, Kent, for planting - - - -	2	10	0

	Acres.	£.	s.
To Mr. George Payne, of Weybridge, Surry, for planting	2	10	0
To Mr. Joſeph Flight, of Batterſea, Surry, for planting	2	10	0
To Mr. John Harriſon, of Preſton, Kent, for planting	4	20	0
To Mr. John Thorp, of Thames Ditton, for planting	1	5	0
To William Hutchens, Eſq. of Barnes, Surry, for planting	15	75	0
To Mr. John Suter, of Barnes, for planting	1	5	0
To the Rev. Mr. Berriah Brooke, of Ridge, Suffolk, for planting	1	5	0
To the Rev. Mr. John Baber, of Cheſterford, Eſſex, for planting	1	5	0
To John Cook, Eſq; of Tandridge, Surry, for planting	2	10	0
1767. To Mr. Joſeph Talmin, of St. Leonard's, Bromley, for planting	1	5	0
To Arthur Young, Eſq. of Bradfield, Suffolk, for planting	1	5	0
To Mr. Joſeph Flight, of Batterſea, Surry, for planting	15	75	0
To the Rev. Mr. Daniel Hill, of Eaſt Malden, Kent, for planting	1	5	0
To Mr. Thomas Giles, of Breadburn, Kent, for for planting	1	5	0

	Acres.	£.	s.
To Meſſrs. Preble and Royle, of St. Mary's, Northgate, Canterbury, for planting	1	5	0
To Mr. James Johnſon, of Great Shelſley, Worceſterſhire, for planting - -	1	5	0
To Mr. William Fairman, of Tonge, Kent, for planting - - - -	1	5	0
To Mr. Thomas Parſons, of Taunton, Somerſet, for planting - - -	1	5	0
To Mr. Jeremiah Giles, of St. Mary's, Canterbury - - - -	7	35	0
To Mr. Broome Wilts, of Chipping-Norton, Oxon, for planting - - -	1	5	0
To Mr. John Harriſon, of Preſton, Kent, for planting - - - -	1	5	0
To Mr. John Dudlow, of St. Mary's, Northgate, Canterbury, for planting -	1	5	0
To William Hutchings, Eſq. of Barnes, Surry, for planting - - - -	8	40	0
To Mr. Charles Row, of the Devizes, Wilts, for planting - - -	2	10	0
To Mr. William White, of Ide, near Exeter, for planting - - -	1	5	0
To Mr. John Lane, of Teynham, near Sittingbourn, Kent, for planting -	1 ¼	7	10
1768. To Mr. Thomas Beavor, of Hithel, Norfolk, for planting - -	2	10	0

	Acres.	£.	s.
To Mr. John Neame, of Birchington, in the Iſle of Thanet, for planting -	1	5	0
To Mr. John Reynolds, of Adiſham, Kent, for planting - - - -	4	20	0
To Mr. Joſeph Flight, of Batterſea, Surry, for planting - - -	18	90	0
To Mr. Thomas Parſons, of Taunton, Somerſet, for planting - - -	2	10	0
To Mr. Thomas Giles, of Breadburn, Kent, for planting - - - -	4	20	0
To Mr. Jeremiah Giles, of St. Mary's, Canterbury, for planting - -	7	35	0
To Mr. John Lane, of Teynham, near Sittingbourn, Kent, for planting -	1	5	0
To Mr. John Crow, of Feverſham, Kent, for planting - - -	2	10	0
To Mr. John Harriſon, of Preſton, Kent, for planting - - -	13	65	0
To Mr. Charles Roſe, of the Devizes, Wilts, for planting - - -	2	10	0
To George Payne, Eſq. of Weybridge, Surry, for planting - - -	2	10	0
To Mr. John Dudlow, of Canterbury, for planting - - -	3	15	0
To Mr. Thomas Giles, of Breadburn, Kent, for planting - - -	3	15	0
To Mr. John Harriſon, of Preſton, Kent, for planting - - -	6	30	0

CHAP. V.

Premiums and Bounties for raiſing HEMP.

		Acres.	£.
1763.	TO Mr. Joſeph Higgins, of Preſton, Salop, for raiſing - -	35	40
	To Mr. John Elſmere, of the pariſhes of St. Julian and Pontſbury, Salop, for raiſing	19	30
	To Mr. * *Chriſtopher Michell*, of Putford, Devon, for raiſing - - -	45	40
	To Mr. * *William Jones*, of Putford, Devon, for raiſing - - - -	40	20
	To Mr. Giles Hawkins, of Eaſt Chinnock and Weſt Coker, Somerſet, for raiſing -	31	10
1764.	To Mr. Giles Hawkins, of Weſt Coker, Somerſet, for raiſing - - -	37	40
	To Mr. John Davy, of Weſt Coker, Somerſet, for raiſing - - - -	15	30
	To Mr. William Preſton, of Crowland and Whaploud Drove, Lincolnſhire, for raiſing	10	20

To

* The above premiums were paid to Dr. John Stephens.

	Acres.	£.
To Mr. Joſeph Higgins, of Preſton, Salop, for raiſing - - - - -	18	30
To Mr. John Elſmere, of Shrewſbury, for raiſing - - - - - -	15	20
To Mr. Samuel Elſmere, of Almond-park, Salop, for raiſing - - - - -	15	20
To John Woolmonton, Eſq. for raiſing -	14	20
To James Higgins, for raiſing - -	66	40
To Mr. John Davy, of Yeovil and Weſt Coker, Somerſet, for raiſing - - - - -	43	30
To Mr. John Day, of Weſt Coker, Somerſet, for raiſing - - - - -	29	30
To Mr. Giles Hawkins, of Eaſt Chinnock and Weſt Coker, Somerſet,	31	10

CHAP. VI.

Honorary and Pecuniary Premiums given for cultivating BURNET.

1767. TO John Searancke, Eſq. of Hatfield, in Hertfordſhire, for ſowing thirty-ſeven acres, twenty pounds; but Mr. Searancke, in preference to a pecuniary reward, accepted of a gold medal.

1764.

1764. To Mr. Rocque, of Walham-green, for the improved culture of Burnet, a bounty of - £. 50

1765. To Chriſtopher Baldwin, Eſq. of Clapham-common, Surry, for ſowing ſixteen acres in the pariſh of Batterſea, —— — — 15

To the Rev. Mr. Davies Lamb, Rector of Ridley, near Dartford, Kent, for ſowing eight acres, — 20

To Mr. Richard Scraſe, of Withdean, in the pariſh of Patcham, near Brighthelmſtone, in Suſſex, for ſowing five acres, —— — — 15

1766. To Robert Barber, Eſq. of Gover, near Exeter, Devon, for ſowing upwards of ten acres in the pariſh of Whetſtone, —— — 10

Premiums given for cultivating LUCERNE.

1763. To Humphry Sturt, Eſq. for ſowing ſeven acres, - - - £. 20

To Colonel Edward Taylor, for ſowing ſeven acres 15

1764. To Mr. John Vallance, of Patcham, near Brighthelmſtone, Suſſex, for ſowing thirteen acres, - 20

To Mr. James Bedel, of North Cray, Kent, for ſowing twelve acres - - - - - 15

To Mr. James Edwards, third premium, for ſowing Lucerne, - - - - - - 10

Premiums

Premiums given for cultivating CARROTS.

	£.
1763. To Mr. * *John Darch*, of Bruſhford, Somerſetſhire, for ſowing of Carrots, - - -	15
To Mr. Robert Billing, of Weaſenham, All Saints, Norfolk, for ſowing thirty acres, - - -	20
1764. To Mr. Robert Billing, of Weaſenham, All Saints, aforeſaid, for ſowing twenty-four acres and an half,	20
1765. To Mr. Robert Billing, for ſowing the like quantity of ground with Carrots, - -	20

Premiums given for cultivating TURNEP CABBAGE, *and* TURNEP-ROOTED CABBAGE.

	£.
1767. To Robert Colville, Eſq. of Newton, in the Iſle of Ely, Cambridgeſhire, for the culture of Turnep Cabbage,	— 20
1769. To Mr. John Reynolds, of Adiſham, in Kent, for introducing the Turnep-rooted Cabbage, not heretofore made uſe of in this country, but more eſpecially for his particular attention to promote the Views of the Society, a bounty of - -	— 50

Premiums given for cultivating divers Kinds of GRASS.

	£.
1764. To John Freeman, Eſq. of Chute-lodge, Wilts, for producing twenty-one hundreds, one quarter, and thirteen pounds, of White Clover ſeed, produced on his lands, - -	— 20

* This premium was paid to Dr. John Stephens.

		£.	s.
1765.	To Mr. Thomas Haſker, of Sherfield-upon-Loddon, Hants, for one thouſand and nine pounds of White Clover Seed, produced on fourteen acres, - -	—	20 0
1766.	To Mr. William Judge, of Widford, near Chelmsford, in Eſſex, for gathering the ſeed of Meadow Fox-tail, and Creſted Dog's-tail, by the hand, - -	—	5 0
	To Mr. Edward Birch, of Stone Eaſton, near Wells, in Somerſetſhire, for gathering, in like manner, the ſeed of Creſted Dog's tail, -	—	5 0
	To Mr. William Goſſe, of Ringwood, Hants, for gathering the ſeed of Creſted Dog's-tail, by the hand — — —	—	3 3
1767.	To Mr. Thomas Stacey, of Mitcham, Surry, for gathering the ſeed of Meadow-feſcue by the hand, - -	—	10 0
	To Mr. William Goſſe, of Ringwood, Hants, for two ounces of annual Poa ſeed, - -		2 2
	To Mr. William Goſſe, of Ringwood, Hants, for gathering Vernal-graſs ſeed by the hand, firſt premium, — — - -	—	10 0
	To Mr. William Black, of Wagher, Yorkſhire, firſt premium, for gathering fine Bent, -		10 0
	To the ſaid William Black, firſt premium, for gathering Creſted Dog's-tail, - -		10 0
	To Mr. James White, of Leigh-on-Mendip, Somerſetſhire, ſecond premium, for gathering Creſted Dog's-tail, - - -	—	5 0

To

	£.	s.
To Mr. William Goſſe, of Ringwood, Hants, firſt premium, for Meadow-feſcue, - -	2	2
To Mr. William Goſſe, part of the ſecond premium, for fine Bent, - - -	2	2
1768. To Mr. Thomas Stacey, of Mitcham, Surry, for ſowing the following Graſs ſeeds, viz. Meadow-feſcue, Common Poa, Vernal Poa, Yellow Oat, Meadow Fox-tail, and Creſted Dog's-tail, - - - -	140	0

CHAP. VII.

Honorary Premiums given for STOCKS of BEES.

	Stocks.	Medals.
1762. TO Mr. Thomas Faucet, of Oxque, in Yorkſhire, for the greateſt number of Stocks, being	223	a gold medal.
To Mr. Thomas Slarke, for the ſecond greateſt number, being —	110	a ſilver medal.
1763. To Mr. Thomas Faucet, for	185	a gold medal.
To Mr. Thomas Slarke, for -	128	a ſilver medal.
1764. To Mr. Thomas Faucet, for	124	a gold medal.
To Mr. Thomas Haynes, of Oundle, Northamptonſhire, for —	105	a ſilver medal.
1765. To Mr. Thomas Faucet, for	182	a gold medal.

Pecuniary

Pecuniary Premiums given for STOCKS *of* BEES.

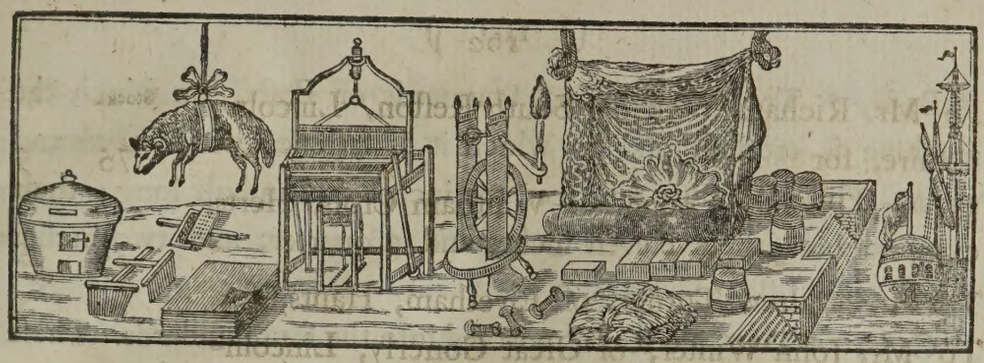
	Stocks.	£.
1764. To Mr. Thomas Harvey, Yeoman, of Elmdon, Eſſex, for - - - -	150	10
1765. To Mr. William White, of Stretford, Oxon, for - - - - - -	32	5
To Mr. John Edmonds, of Rudſton, Yorkſhire, for	38	5
To Mr. Thomas Shovelar, of Biſhopſbourn, Kent, for - - - - -	35	5
To Mr. James Snelling, of Woking, Surry, for	35	5
To Mr. John Howard, of Woking, Surry, for -	32	5
To Mrs. Mary Pitches, of Exning, Suffolk, for -	30	5
To Mr. Thomas Faucet, of Oxque, Yorkſhire, for	122	5
To Mr. Richard Jeniſon, of Market-weighton, Yorkſhire, for - - - - -	31	5
To Mr. Robert Bruce, of Ford, Northumberland, for - - - - - - -	33	5
To Mr. Jonathan Satchell, of Kettering, Northamptonſhire, for - - - - -	39	5
To Mr. John Short, of Chilbolton, Southamptonſhire, for - - - - -	36	5
To Mr. John Pendred, of Wellingborough, Northamptonſhire, for - - - - -	42	5
To Mr. William Gilbert, of Exning, Suffolk, for	32	5
To Mr. Thomas Slarke, of Sunning-hill, Berks, for	78	5
To Mr. Benjamin Harris, of Aſton Tirrold, Berks, for	30	5

	Stocks.	£.
To Mr. Richard Weſt, of South Reſton, Lincolnſhire, for - - - - -	75	5
To Mr. Thomas Young, of Waltham Croſs, Herts, for - - - - - -	34	5
To Mr. Andrew Turner, of Elvetham, Hants, for	30	5
To Mr. John Winter, of Great Gonerly, Lincolnſhire, for - - - - -	30	5
To Mr. Peter Daley, of Woodbury, Devon, for -	45	5
To Mr. Nathaniel Cory, of Bugbrook, Northamptonſhire, for - - -	30	5

Premiums and Bounties for BEES WAX.

1765.	To Mr. Nathaniel Thorley, - - -	5
	To Mr. Andrew Turner, - - - -	5
	To Mr. Joſeph Pohles, - - - - -	5
	To Mr. Thomas Young, - - - - -	5
	To Mr. Peter Daley, - - - - -	5
	To Mr. Richard Jeniſon, - - -	5
	To Mr. Frederick Barnard, - - - -	5

END OF BOOK III.



BOOK IV.

MANUFACTURES;

COMPREHENDING

Deſcriptions and Explanations of ſuch of the Society's Machines and Models, in Manufactures, as are repreſented in the Copper-plates hereunto annexed.

CHAP. I.

A Deſcription of Mr. UNWIN'S STOCKING-FRAME.

PLATE I. FIG. 1. *A perſpective View of the* MACHINE.

A, A, TWO Standards or Poſts, two feet and an half long, and three inches ſquare; on the upper ends of theſe Poſts are faſtened two brackets, and a ſeat for the hoſier to ſit on.

B, B,

B, B, The two principal Standards or Poſts, on which the machine is erected, and to which it is faſtened with ſcrews and nuts. Theſe Poſts are four feet, ten inches and an half long; their extreme breadth is eleven inches and a quarter, and two inches thick.

C, C, Two Side Rails, mortiſed into the four ſtandards. Theſe Rails are each eighteen inches and three quarters long, excluſive of their tenons; four inches and an half broad, and two inches thick.

D, D, Two Brackets, faſtened to the ſhort poſts A, A, to ſupport the hoſier's ſeat k.

E, E, Two croſs Rails, mortiſed into the under ends of the poſts or ſtandards A, A, and B, B. The front Rail is eighteen inches long, excluſive of its tenons; three inches and three quarters broad, and two inches and three quarters thick. The back Rail is twenty inches and two-twelfths long, excluſive of its tenons; three inches and a quarter broad, and two inches and a quarter thick.

F, A Gage-frame, conſiſting of four ſhort poſts, mortiſed into the fore-rail E, and capped with a piece of wood nine inches and eight-tenths long, and three inches and a quarter broad; its upper ſurface is thirteen inches and an half above the bottoms of the ſtandards A, A. Each of theſe four ſhort poſts is four inches and an half long, three inches broad, and eight-tenths of an inch thick. This Gage-frame contains three treadles, whoſe fulcrum, or round iron ſpindle, paſſes through their fore ends, which are guided by the four ſhort poſts before-mentioned.

G, G, G,

G, G, G, Three Treadles, the two outermoſt of which are alternately forced down, by the feet of the hoſier, to give a retrograde motion to the ſlur wheel K, the ſlur-box R, &c. to which they are connected by the cords b, b, and d, d. The middle Treadle is connected to the under balance-frame H f, and the preſſer-bar Y Y, by the jointed rods g, g, a, i, i, and c, c. This Treadle gives motion to the ſinkers, ſtay-frames, &c. by means of the rods c, c, connected to the jointed rods g, g. See Fig. 2.

H, The under Balance-frame, whoſe iron fulcrums f, f, or centers of motion, paſs through the arms of the ſaid Balance-frame and the poſts B, B, to which the center-pins f, f, are faſtened with ſcrews and nuts. N. B. Only one of theſe pins is ſeen in this view of the machine.

I, I, Two wooden Rails, one in the back, the other in the front; in the latter there are two drawers to keep ſmall tools. The front Rail is twenty inches and a quarter long, excluſive of its tenons; three inches and two-twelfths broad, and two inches and a quarter thick. The back Rail is twenty inches and a quarter long, three inches and a quarter broad, and two inches and one-twelfth thick. Both theſe Rails are mortiſed into the poſts B, B; each of them having an iron plate ſcrewed to their ſides, in which the ſpindle of the ſlur-wheel K, turns. N. B. The front Rail and one of the iron plates, only, are ſeen in this view of the machine.

K, The Slur-wheel, is ſeventeen inches diameter, and one inch thick, with a deep groove on its periphery to receive the ſlur-lines d, d: on the inſide of this Wheel, there is a grooved pulley

for

for the treadle-cords b, b. This Slur-wheel is ſupported by its ſpindle or axis, in the iron plates affixed to the rails I, I.

L, The Axis of the Caſter-backs.

M, The Lever, or Handle, of the Caſter-backs.

N, The Needles.

O, The Jacks.

P, The Falling-bar.

Q, The front Slay-bar.

R, The Slur-box and Slur-bar. See Fig. 2. Plate II.

S, S, The Star-ſcrews, by which the falling-bar P, is raiſed or depreſſed.

T, T, The Slur-pullies, Slur-bar, &c. See Fig. 2, 3, and 4.

V, V, Two Springs, faſtened to the perpendicular plates of the ſinker and falling-bar frame. Theſe Springs ſerve to fix the ſtar-ſcrews, when the falling-bar P, is ſet to its proper height.

U U, The Locking-bar, which receives the ſhoulders of the jacks, and raiſes them up, when they have been forced down by the ſlur-box R, &c. See Fig. 2 and 3.

W, W, Two Iron Plates, with a hole in each of them for the hooks and chains connected to the caſter-backs, &c. See Fig. 2 and 3.

X, X, Two fixed Iron Plates, in each of which there is a long mortiſe and ſcrew to regulate the depth of the jacks, &c. See Fig. 2 and 3.

Y Y, The Preſſer-bar. See Fig. 2 and 3.

Z, Z, The Sinkers. See Fig. 2.

a,

a, An Iron Rod, connected to the balance-frame, middle treadle, pulley w, &c. See Fig. 2 and 4.

b, b, Two Cords, faſtened to the two outermoſt treadles, and the groove pulley x, on the inſide of the ſlur-wheel K. See Fig. 2. and 4.

c, c, Two Iron Rods, connected to the ſinker-bar, ſtay-frame, and the arms of the balance-frame H, &c.

d, d, The Slur-lines. See Fig. 2 and 3.

e, e, Two ſemicircular Arms, or Web-hooks, to which the hoſe is faſtened.

f, f, Two Iron Bolts, or Center Pins, with which the balance-frame H, is connected to the principal poſts B, P. N. B. Only one of theſe Pins is ſeen in this view of the machine.

g, g, Two jointed Iron Rods, to which the flat rods i, i, are faſtened with round-headed iron pins. Theſe Rods are connected to the middle treadle, ſlay-frame, and preſſer-bar, as before-mentioned.

h, h, Two Iron Plates, (fixed to the wooden rails I, I,) in which the ſpindle of the ſlur-wheel K, turns. Only one of theſe Iron Plates are ſeen in this view, the other being faſtened to the back rail, repreſented in Fig. 4.

i, i, The Iron Rods, of the preſſer-bar, &c. are flatted at their upper ends, to which the preſſer-bar Y Y, is faſtened with two round-headed ſcrews. See Fig. 2.

k, The Seat, on which the hoſier ſits to work, is two feet long, nine inches and an half broad, and ſeven-eighths of an inch thick.

l, l,

l, l, Two moveable Iron Staples, to ſteady the ends of the falling-bar P.

m, m, Two Iron Staples, driven into the rail I, to guide and ſteady the rods i, i.

n, n, &c. Four Screws and Nuts, (on each ſide of the frame) by which the machine is faſtened to the poſts B, B. See Fig. 2, 3, and 4.

o, o, Two Iron Rollers, which ſuſtain the leather ſtraps hereafter mentioned. See Fig. 2. 3. and 4.

PLATE II. FIG. II.

A, A, The upper Ends of the two Standards or Poſts, which ſupport the ſeat k.

B, B, The upper Ends of the two principal Standards or Poſts, on which the machine is erected, and faſtened with ſcrews and nuts.

I, The front Wooden Rail, mortiſed into the ſtandards B, B. See deſcription of Plate I.

K, The Slur-wheel, deſcribed in Plate I.

L, The Axis of the caſter-backs.

M, The Handle, or Lever, of the caſter-backs.

N, The Needles.

O, The Jacks.

P, The Falling-bar.

Q, The front Slay-bar.

R, The Slur-box, and Slur-bar.

S, S,

S, S, Two Star-ſcrews, by which the falling-bar P, &c. is raiſed or lowered.

T, T, Two Slur-pulleys, and Pulley-frames. See Fig. 3. and 4.

V, V, Two Springs, faſtened to the perpendicular plates of the ſlay-bar frame, &c. See deſcription of V, Plate I.

UU, The Locking-bar. See deſcription of Plate I.

W, W, Two Plates of Iron, deſcribed in Plate I.

X, X, Two fixed Iron Plates. See deſcription of Plate I.

Y Y, The Preſſer-bar.

Z, Z, The Sinkers.

a, An Iron Rod, connected to the balance-frame. See deſcription of Plate I.

b, b, Two Cords, faſtened to the two outer treadles, and to the grooved pulley on the inſide of the ſlur-wheel K.

c, c, Two iron rods, connected to the ſlay-frame, &c. See the deſcription of Plate I.

d, d, &c. The Slur-lines.

e, e, Two ſemicircular Arms, or Web-hooks, to which the hoſe are faſtened.

g, g, Two jointed Iron Rods.

h, The two Iron Plates, which ſuſtain the ſlur-wheel, &c.

i, i, The Rods of the preſſer-frame. See deſcription of Plate I.

k, The Seat on which the hoſier ſits.

l, l, Two moveable Iron Staples, to ſteady the ends of the falling-bar P.

m, m, Two Iron Staples, fixed in the front rail I, to direct the rods i, i.

n, n, n, n, Four Screws and Nuts, by which the machine is faſtened to the poſts B, B.

o, o, Two Iron Rollers, which ſuſtain the leather ſtraps. See Fig. 3.

q, q, Two Pieces of flat Iron, whoſe upper ends turn horizontally at right angles with their perpendicular faces; and, like tenons, paſs through an aperture in each end of the front ſlay-bar Q, to which, and the back ſlay-bar U, they are faſtened with ſcrews and nuts, leaving a ſpace between the two ſaid bars, for the Jacks to move freely up and down. See Fig. 3.

PLATE III. FIG. 3.

B, B, The upper Ends of the two principal Poſts or Standards, on which the machine is erected. See deſcription of Fig. 1. and 2.

K, Part of the Slur-wheel.

L, The Axis of the Caſter-backs.

R, The Slur-box, and Slur-bar.

S, S, The Star-ſcrews. See deſcription of Fig. 1. and 2.

T, T, The Slur-pullies, Slur-bar, &c.

U, U, The Locking-bar. See deſcription of Plate I.

W, W, Two Plates of Iron. See deſcription of Plate I.

X, X,

X, X, Two fixed Iron Plates. See their uſe in deſcription of Plate I.

Y Y, The Preſſer-bar.

c, c, Two Iron Rods. See deſcription of Plate I.

d, d, Part of the Slur-lines. See Fig. 1 and 2.

i, i, Part of the Iron Rods of the preſſer-bar. See deſcription of Plate I.

n, n, &c. Screws and Nuts. See their uſe in deſcription of Plate I.

o, o, Two Iron Rollers, by which the leather ſtraps p, p, are ſupported.

p, p, Two Leather Straps, with which the rods i, i, the ſlay-frame, &c. are connected.

q, q, See deſcription of Plate II.

r, r, The Spring-ſtock, or Piece of Wood, into which the ſinker-ſprings are faſtened.

s, s, The Joints of the caſter-backs.

t, The Sinker-ſprings.

u, The back Slay-bar.

PLATE III. FIG. 4.

B, B, The Tops of the two principal Poſts, which ſupport the machine. See deſcription of Plate I.

I, The back Wooden Rail. See deſcription of Plate I.

K, The Slur-wheel, with a view of the groove on its periphery. See deſcription of Plate I.

L,

L, The Axis of the caſter-backs.

O, The Jacks.

R, The Slur-box, &c.

S, S, The two Star-ſcrews. See their uſe in deſcription of Plate I.

T, T, The Slur-pullies.

n, n, &c. Screws and Nuts. See deſcription of Plate I.

p, p, Two Leather Straps. See their uſe in deſcription of Fig. 3.

r, r, The Spring-ſtock. See the deſcription of Fig. 3.

s, s, The Joints of the caſter-backs.

t, The Sinker-ſprings.

v, v, Four Friction-rollers, connected to the ſlur-box, which they guide and ſteady in its motion forward and backward along the ſlur-bar: two of theſe Rollers are placed under the ſlur-bar, but are not ſeen in this view. See Fig. 2.

w, The Pulley, Leather Strap, and Iron Rod, with which the middle treadle is connected to the balance-frame, &c.

x, A Pulley, fixed on the axis of the ſlur-wheel K, and is actuated by the outer treadles G, G, and the lines b, b.

This Machine was examined by ſeveral reputable Hoſiers, and worked in preſence of the Committee of Manufacturers, who recommended to the Society to give Mr. Unwin the ſum of eighty pounds, part of the Premium of one hundred pounds; and a farther ſum of twenty pounds, if he ſent a complete frame of the ſame conſtruction, to be left in the Society's Repoſitory of Manufactures. This Reſolution of the Committee was agreed to, February 14, 1765.

CHAP. II.

Deſcription and Explanation of Mr. ALMOND'S LOOM.

PLATE I. FIG. 1.

A Geometrical Elevation of the Front of the LOOM.

A, A, A, A, THE four Legs of the chair, or ſeat, two of which Legs are faſtened to the upper edge of the under rail L, in the front of the loom.

B, A round-headed Iron Rod, which paſſes through the legs of the chair, and is faſtened thereto with an Iron wedge, or key, driven through an aperture in the end of the rod.

C, C, C, Three Wooden Cylinders, with a hole in each of them for the iron rod to paſs through: their uſe is to keep the treadles at a proper diſtance from each other.

D, D, Two Treadles, each three feet five inches long, one inch and an half broad, and one inch and a quarter thick at their center ends, and one inch in diameter at their points. Theſe Treadles move in an oblique direction, their center ends being two inches and an half diſtant from each other, and their points, or inner ends, ſix inches (inſide meaſure) from each other. The iron rod B paſſes looſely through the center or fore ends of the treadles, and is the fulcrum on which they move.

E, E,

E, E, The under Jacks, are each three inches long, one inch and a quarter broad, and three quarters of an inch thick. Their upper ends turn on an iron pin, with which they are connected to the under lams.

F, F, The Skippers, are each eleven inches long, one inch broad, and three-eighths of an inch thick. Theſe Skippers are connected to the treadles, lams, and harneſſes, with wooden jacks and cords, as repreſented in Fig. 1. &c.

G, G, G, G, The upper Jacks, are connected to the lams, harneſſes, &c. as before-mentioned; but there are only three of them ſeen in this view of the loom, the other being behind the middle jack.

H, H, The two front Poſts of the loom, are two feet nine inches and an half long, (excluſive of their tenons) three inches and an half broad, and one inch and three quarters thick.

I, I, The Swords of the Batten, are each three feet, two inches and an half long, (from out to out) three inches and an half broad, and three quarters of an inch thick; and, as their fulcrum, or center of motion, is fixed at the bottom of the frame, it is much leſs liable to vibrate than any common loom.

K, K, Two Cleats, or Pieces of Wood, each one foot long, two inches and an half broad, and two inches and a quarter thick, with an aperture, or long mortiſe, through which the under ends of the batten-ſwords are inſerted, and ſet to a proper degree of inclination, &c. with a round iron pin, or fulcrum, which is occaſionally ſhifted from one hole to the other, in the cleats and ſwords of the batten. See K, Fig. 3.

L,

L, The under Rail, in the front of the loom, is two feet nine inches long, from ſhoulder to ſhoulder of its tenons, four inches broad, and two inches thick. The fore legs of the chair, or ſeat, A A, &c. are faſtened to the upper edge of this Rail, as before-mentioned.

M, The Cloth-beam, or Roller, is two feet eight inches long, and three inches and an half in diameter.

N, The Breaſt-beam, is three feet four inches long, four inches broad, two inches and an half on the back edge, and two inches on the fore edge, with an aperture in its front, through which the cloth is conveyed to the beam or cloth roller M.

O, The Hand-rail, or Cap of the Batten, is three feet four inches long, one inch and an half broad, and nine inches and a quarter thick, with a groove on its under ſide to receive the ſlay, or reed, and a mortiſe at each end of it, properly fitted to the upper ends of the batten-ſwords.

P, The Harneſs, with its upper Stave, &c.

Q, The Tug Lines, properly fitted to the pullies and harneſs ſtaves.

R, R, Two Wooden Pullies and Pins, which carry the tug lines of the harneſs, &c. Theſe Pullies are let into a notched piece of wood, ſuſpended to an iron frame.

S, The Iron Frame, to which the notched piece of wood with the pullies are ſuſpended. The perpendicular and curved arms of the Iron Frame are half an inch ſquare, and their under ends are driven, like tenons, into the mortiſes in the ſide rails of the loom. See Fig. 3. The dimenſions of their under ends are

one

one inch and a quarter broad, and three-eighths of an inch thick, with ſmall ſhoulders projecting over their edges, &c. See Plate III.

T, A Bobbin, or Spull, with yarn to mend the broken threads of the web.

V, A grooved Wheel, ſeven inches in diameter, and one inch and an half broad on its periphery; this Wheel is faſtened to the end of the cloth-beam, having two circumvolutions of cord round its periphery; one end of the cord is faſtened to the under rail L, in the front of the loom, and at the other end is ſuſpended the dead weight Z. This weight ſerves to draw forward the web, when the iron trigger or click of the ratchet-wheel X, is lifted up with the foot on the cord Y.

U, U, The Ends of the under Batten, mortiſed into the ſwords I, I.

W, W, Two Flat-ſhaws, ſeven inches diameter, faſtened to the ends of the yarn-beam, to keep the liſt of the web true and even on the beam, as repreſented in Plate II.

X, A Ratchet-wheel, faſtened to the end of the yarn beam.

Y, A Cord faſtened to the end of the iron trigger or click of the ratchet-wheel, and to the under rail L, in the front of the loom.

Z, A Dead-weight, ſuſpended to the end of a cord wound twice round the grooved wheel V, and faſtened to the rail L, in the front of the loom. This Weight, as before-mentioned, ſerves to draw the web forwards, when the iron triggers or clicks of the ratchet-wheels are lifted up with the cords Y, Z.

PLATE

PLATE II. FIG. 2.

A Geometrical Elevation of the LOOM, *taken from the back ſide thereof.*

A, A, The fore Legs of the Chair.
B, The Iron Rod.
C, C, C, The Wooden Cylinders.
D, D, The Treadles to the fore legs of the chair.
E, E, The under Jacks.
F, F, The Skippers.
G, G, &c. The upper Jacks.
I, I, The Swords of the Batten.
K, K, Two Cleats, or Pieces of Wood, with long mortiſes to receive the ſwords of the batten.
M, The Cloth-beam.
N, N, The Ends of the Breaſt-beam.
O, O, The Ends of the Hand-rail, or Cap of the Batten.
P, The Harneſs, with its upper ſtaves, &c.
Q, The Tug-lines.
R, R, Two Wooden Pullies and Pins, &c.
S, The curved Iron Frame, with the Pullies, &c.
T, The Ends of the Bobbin-frame. See Fig. 1.
V, The Grooved Wheel, which carries the dead-weight.
U, U, The ends of the under Batten.

W, W, Two Flat-ſhaws, on the ends of the yarn-beam.

X, A Ratchet wheel, faſtened to the end of the yarn-beam.

Z, The Dead-weight, and looſe Cord, faſtened to the end of the click of the ratchet-wheel X, at the end of the cloth-beam M.

a, The under Rail, at the back of the loom, is two feet nine inches long, (excluſive of its tenons) four inches broad, and two inches thick.

b, b, The two back Poſts of the loom, are each three feet two inches and three quarters long, three inches and an half broad, and one inch and three quarters thick.

c, c, The Counter-maſhes, are each two feet five inches long, one inch broad at their back or center ends, five-eighths of an inch broad at their points or fore ends, and half an inch thick.

d, The Yarn-roller, or Beam, with its flat-ſhaws and ratchet-wheels.

e, The upper Rail, at the back of the loom, is two feet nine inches long, (excluſive of its tenons) two inches and an half broad, and two inches thick ; the upper end of this Rail is fixed one inch and an half higher than the breaſt-beam, and nine inches above the center of the yarn-roller, or beam.

f, The Spindle of the Yarn-beam, or Roller.

N. B. If there was a roller for the web to bear on, inſtead of this rail, there would be much leſs friction to the yarn, than there is by its bearing on a fixed rail. By the application of this bearing rail, or roller, the following advantages are obtained ; viz.

I. The web is raiſed to a proper height, to keep the upper ſhades, or boſoms, ſomewhat ſlacker than the under ; by which means

means it cloaths better than when the ſhades are both of an equal tenſion.

II. By raiſing the web behind the harneſs, the broken threads are much eaſier come at, than when the web is level with the breaſt-beam.

III. By fixing the Yarn-beam under this Bearing-rail, or Roller, the web is at all times kept exactly in the ſame poſition; but when the web (as in the uſual way) is worked off from the Yarn-beam, its height, inclination, and diſtant from the breaſt-beam, are varying at every revolution of the Yarn-beam, or Roller.

IV. The generality of looms for weaving plain woollen cloth, have their Yarn-beams, or Rollers, fixed ſo near to the harneſs, that, notwithſtanding the flexibility of woollen yarn, the threads of the web are frequently broken in opening the ſhade wide enough for the ſhuttle to paſs through; and, as they often break on the Yarn-beam, the weaver is obliged, when it ſo happens, to go out of his loom to tie the broken pieces of yarn, which are commonly very difficult to be found, eſpecially when the web is badly rolled up round the Beam.

Theſe defects are in a great meaſure removed by the application of the before-mentioned Rail, or Bearing-roller, and by fixing the Yarn-beam at a proper diſtance therefrom; by which means there will be a greater length of web between the harneſs and Yarn-beam; conſequently, it will ſtretch and yield more freely to the ex-

panſion

panſion of the ſhade ; and at the ſame time be leſs liable to break the threads of the web on the Beam, by the diminution of the tenſion between the Bearing-rail and the Yarn-beam.

PLATE III. FIG. 3.

A perſpective View of the LOOM.

A, The Chair.
B, The round-headed Iron Bolt.
D, The Treadles.
E, The under Jacks.
F, The Skippers.
G, The upper Jacks.
H, H, The two front Poſts.
I, I, The Swords of the Batten.
K, A Wooden Cleat, in which the ſword is inſerted.
L, The under Rail, in the front of the loom.
M, The Cloth-beam, indicated by dotted lines.
N, The Breaſt-beam.
O, The Hand-rail, or Cap of the Batten.
P, The Harneſs.
Q, The Tug-lines.
R, R, The Pullies.
S, The curved Iron Frame, which ſuſtains the harneſs, &c.
T, The Bobbin.
V, The Grooved Wheel and Ratchet (not ſeen in this view.)

U,

U, The under Batten, mortiſed into the Swords II.

W, W, The Flat-ſhaws, &c.

X, The Ratchet-wheel, and Click of the Yarn-beam d.

Y, The Cord faſtened to the click of the ratchet-wheel of the yarn-beam.

Z, The Dead-weight, and looſe Cord, faſtened to the click of the cloth-beam.

a, The under Rail at the back of the loom.

b, b, The two back Poſts of the loom.

c, c, The Counter-maſhes.

d, The Yarn-beam, with its flat-ſhaws, ratchet-wheel, trigger, and winch to turn up the web on the yarn-beam.

e, The upper Rail, at the back of the loom.

f, The Iron Spindle of the Yarn-beam, with its Winch, with which the yarn is wound up on the beam or roller.

This Loom was invented by Mr. JOHN ALMOND, of Great Eaſton, in Leiceſterſhire, and by him produced to the Society, who appointed the Committee of Manufactures to examine all its Parts and Movements; which were minutely examined, explained and worked, by the Inventor, in preſence of the ſaid Committee and ſeveral ſkilful Manufacturers, who were fully convinced of its utility; it was therefore the opinion of the Committee, that Mr. ALMOND's Loom is an ingenious and uſeful Invention, and deſerving of the Encouragement of the Society.

Reſolved to recommend to the Society to give Mr. ALMOND a Bounty of fifty Guineas for his new invented Loom, he leaving the ſame with the Society for the Uſe of the Public: to which Reſolution of the Committee the Society agreed January 9, 1771.

CHAP. III.

A Deſcription and Explanation of an ITALIAN-REEL *procured by a Worthy Member of the Society.*

FIG. 1. *A perſpective View of the* REEL.

A, THE Stand, or Frame of the Reel.

B, B, &c. The Bearing-bars, or Rails, of the Reel, each two feet long, one inch and ſeven-eighths of an inch broad, and one inch and a quarter thick, bevelled on each of their upper ſides to an acute angle, leaving their upper or bearing edges ſmooth and round, about the thickneſs of a crow-quill. Theſe Rails are one foot eight inches and an half diſtant from each other.

C, C, C, C, The Arms of the Reel, are fixed at right angles to their axis, and each of them ten inches and ſeven-eighths of an inch long, one inch and an half broad, and one inch and a quarter thick. Theſe Arms are inſerted into D, the axis of the Reel, and faſtened thereto with wooden wedges. Two of the Arms, with their bearing-bar, are dove-tailed together, and are taken out occaſionally, when the ſilk is to be taken off the Reel; and faſtened together again with four wooden pins (as repreſented in Fig. 1. and 2.) when the ſilk is to be wound off the cocoons.

D,

D, The Axis of the Reel, two feet one inch long, from ſhoulder to ſhoulder, and three inches ſquare at that part where the arms paſs through the Axis.

E, A Vertical Pulley, ſix inches diameter, and one inch and a quarter thick. This Pulley is faſtened to the inner end of the axis D, and revolves with it; carrying a band, or line, which is connected to the horizontal pulley F.

F, An Horizontal Pulley, nine inches and an half in diameter, and one inch and a quarter thick. This Pulley revolves round a flat-headed wood-ſcrew, three-eighths of an inch thick, with which it is faſtened to the ſliding-block H; the uſe of which block is ſhewn in Fig. 2.

G, A ſliding Valve, or Regulator, which acts as a crank, and runs in two grooved pieces of wood, faſtened to the upper ſurface of the horizontal pulley. The uſe of this ſliding Valve is to extend, or ſhorten, the radins of the crank, by ſetting the pin of the Valve farther or nearer to the center of the horizontal pulley, by moving, occaſionally, the pin in the holes of the upper ſurface of the valve.

H, A ſliding Block, two inches and ſeven-eighths broad, and two inches thick; on each ſide of this Block, there is a rib or ledge one-ſixth of an inch ſquare, which runs in a groove, or rabbet, in each ſide of the box I, on the top of the pillar M, and in the ſame manner as the ribs of the ſliding valve G. The uſe of this ſliding Block is to keep the band, or line, to a certain degree of tenſion, by means of the weight-line and pulley K.

I, A Box, ten inches long, four inches and a quarter broad,

and

and three inches deep, ſupported on the pillar M. In each ſide of this Box, there is a groove for the ribs of the ſliding block H, to run in, as before-mentioned.

K, A Weight, about ſeven pounds, (ſuſpended to a line and pulley) more or leſs, according to the friction of the ſliding block H, and the thickneſs of the band, which is kept at a proper degree of tenſion by this weight.

L, A Guide-ſtick, or Directing Rod, with two wires rivetted thereto, projecting five inches and an half above it; each wire has a ſmall ring, or helix, as repreſented in Fig. 1. and 2. The ſilk threads paſſing through theſe rings, or helixes, are laid obliquely on the bars of the reel, by means of the progreſſive and regreſſive motion of the Guide-ſtick; at the end of which Stick, there is a hole to receive the iron pin in the end of the ſliding valve G.

M, A Pillar, ten inches long, (including its plinth) and three inches diameter, mortiſed into the rail N, diſtant nine inches from its fore end.

N, The back Rail of the Frame: its extreme length is ſix feet three inches and an half, four inches broad, and three inches thick.

O, The fore Rail, is of the ſame dimenſions as the rail N.

P, The Font-poſt, is one foot four inches long from the ſhoulder of the tenon, three inches broad, and one inch and an half thick: through the head of this Poſt is pierced an oval hole, parallel with the upper ſurface of the ſliding valve, or regulator G.

Q, The back Poſt, is one foot ſix inches long from the ſhoulder of the tenon, three inches and an half broad, and one inch and a quarter thick. On the upper end of this Poſt, there is a jaw, or aperture, to receive the ſpindle of the axis D, to which ſpindle the pulley E is faſtened with an iron pin, which paſſes through the upper end of the Poſt, to keep the axis from riſing out of its place.

R, A Poſt of the ſame dimenſions, and for the ſame purpoſe as the poſt Q.

S, S, S, S, Four Tranſoms, each one foot nine inches and three quarters long, from ſhoulder to ſhoulder; and of the ſame breadth and thickneſs as the two rails N, O, into which they are mortiſed.

T, T, T, T, Four Standards, or Legs, of the Frame; each one foot ten inches long, four inches broad, and three thick.

V, The Stove, or Fire-place, is three feet long, two feet five inches and an half thick, and one foot ten inches high.

W, An oval Copper Pan, one foot eight inches long, one foot four inches and an half broad, and half an inch deep. This Pan is kept ſupplied with water ſcalding hot, if the cocoons are very hard; but, if they are ſoft, a leſs degree of heat will be ſufficient for the cocoons to be immerged in, whilſt the ſilk is winding therefrom.

X, An Iron Plate, two feet two inches long, one inch and an half broad, and one-eighth of an inch thick; perforated with holes for the ſilk to paſs through: at each end of this Iron Plate,

there is a ſhank, which is driven into the two fore ends of the rails N, O.

Y, An Iron Funnel, to carry off the ſmoke.

Z, A Winch, with which the reel is turned: its radius is five inches.

FIG. 2.

F, The Horizontal Pulley, drawn to a large ſcale to make it the more expreſſive.

G, The ſliding Valve, or Regulator.

H, The ſliding Block; whoſe dimenſions are indicated by the dotted lines.

I, The Box, which contains the ſliding block.

K, The Weight-line, &c.

L, The Guide-ſtick, &c.

M, The Pillar, which ſupports the box, &c.

CHAP. IV.

A Deſcription and Explanation of the ITALIAN SILK-REEL; *to which is added Mr.* VERRIOR'S *Method of laying the Silk Obliquely thereon.*

A, A Perſpective view of the Reel, with all its parts and movements put together.

B, B, &c.

B, B, &c. The Bearing-bars or Rails of the Reel, each two feet long, one inch and ſeven-eighths of an inch broad, and one inch and a quarter thick; their upper ſides are bevelled off to an acute angle, leaving their upper or bearing edges ſmooth and round, about the thickneſs of a crow quill. Theſe Rails are one foot eight inches and an half diſtant from each other.

C, C, C, C, The Arms of the Reel, are fixed at right angles to their axis, and are each of them ten inches and ſeven-eighths of an inch long, one inch and an half broad, and one inch and a quarter thick. Theſe Arms are inſerted into D, the axis of the reel, and faſtened thereto with wooden wedges: two of the Arms, with their bearing-rails, are dove-tailed together, and are taken out, occaſionally, when the ſilk is to be taken off the reel; and faſtened together again with four wooden pins, (as repreſented in Fig 1. and 2.) when the ſilk is to be wound off from the cocoons.

D, The Axis of the Reel, is two feet one inch long, from ſhoulder to ſhoulder, and three inches ſquare at that part where the arms paſs through. The ſpindles of the Axis revolve in two apertures, or jaws, in the upper ends of the poſts G, H, through which are inſerted two wooden pins to prevent the Axis from riſing up.

E, F, G, H, Four Poſts, eighteen inches long, including their tenons; the Poſt E is two inches broad, and one and an half thick; F is two inches and an half ſquare; G and H are three inches broad, and two thick. Theſe Poſts are mortiſed into the rails a, a.

I,

I, An eſcew Wheel, two inches and an half in diameter, (repreſented in Fig. 3.) under the axis of the endleſs ſcrew V. This Wheel, and the crown wheel K, are both on the ſame axis, and are actuated by the endleſs ſcrew before-mentioned.

K, A Crown Wheel, whoſe teeth are made with four wooden pegs driven into the end of the axis; which axis turns on a ſpindle at one end, and on the periphery of the Crown Wheel at the other end. See Fig. 3.

L, A Wooden Rack, fourteen inches long, three quarters of an inch thick, and five-eighths and one-ſixteenth broad; with nine teeth, projecting half an inch from one of its ſides: on its other ſide, there is a rib, or rabbet, fourteen inches and three quarters long, and a quarter of an inch ſquare. See Fig. 5. This Rack paſſes freely thtough the under aperture in the poſt E, carrying with it the ſliding rail M, (with its directing wires, cleat, &c.) which Rail, &c. paſſes through the upper aperture in the poſt E: in the edge of this poſt there is a round hole, or ſocket, wherein the axis of the crown wheel K turns, and gives motion to the rack. See Fig. 3. and 6.

M, The ſliding Rail, is two feet ten inches and three quarters long, two inches and three quarters broad, and five-eighths of an inch thick. This Rail, with its directing wires, cleat, and wooden ſpring, are connected to the rack by an iron center-pin paſſing through the cleat and end of the rack. See Fig. 6.

N, The Cleat, with its wooden ſpring. The Cleat is five inches long, two inches and three quarters broad, and three

quarters

quarters of an inch thick, faſtened to the ſliding rail M. See Fig. 6. At the lower end of this Cleat, the rack is faſtened with an iron center-pin; and, being thus connected to the ſliding rail, communicates its reciprocal motion thereto, by acting, alternately, on the upper and under radius of the crown wheel.

O, A Spring, made of aſh, fir, or ſome other elaſtic piece of wood, four inches long, five-eighths of an inch broad, and one-eighth of an inch thick. This Spring is faſtened to the end of the rack. See Fig. 6.

P, A fixed Rail, or Traverſe, two inches and three quarters broad, and three quarters of an inch thick, (ſee Fig. 6.) faſtened with wood-ſcrews to the two poſts E and F, in Fig. 1. On the under ſide of this Rail is a notch, cut exactly of ſuch a length, that its ſhoulders may, alternately, embrace the point, or upper end, of the wooden ſpring: by this means, the toothed end of the rack is forced up and down, ſo as to act, alternately, on the upper and under radius of the crown wheel, as before-mentioned.

Q, A Section of the Rack, on whoſe inner ſide is a rib, or bearer, four inches and three quarters long, and a quarter of an inch ſquare. This rib bears on a cleat, or ſmall piece of wood, faſtened to the ſide of the aperture in the poſt E; (See R, Fig. 4.) this cleat ſuſtains the Rack, when it is actuated by the upper radius of the crown wheel; but when it is put in motion by the under radius, the rib of the Rack paſſes under the cleat in the aperture of the poſt E. See R, Fig. 4. and 5.

R, The Cleat, or Bearer, is two inches and an half long, and a quarter of an inch thick, on which the rib of the rack is

ſupported,

ſupported, when the upper radius of the crown wheel moves the rack; but paſſes without touching it, when the rack is moved by the under part thereof.

S, S, A Section of the two moveable Arms and Rails of the Reel, dove-tailed, and faſtened together with two wooden pins. See Fig. 2.

T, The Winch of the Reel, whoſe radius is five inches and an half.

V, An endleſs Screw, at the inner end of the axis of the reel, two inches and a quarter in diameter; having a treble thread, or worm, which gives motion to the eſcew wheel I.

W, The Stove, or Fire-place, three feet long, two feet five inches and an half thick, and one foot ten inches high.

X, An oval Copper Pan, one foot eight inches long, one foot four inches and an half broad, and ſeven inches and an half deep. This Pan is kept ſupplied with water ſcalding hot, if the cocoons are very hard; but if they are ſoft, a leſs degree of heat will be ſufficient for the cocoons to be immerged in, whilſt the ſilk is winding therefrom.

Y, An Iron Plate, two feet two inches long, and one-eighth of an inch thick, perforated with holes for the ſilk to paſs through: at each end of this Iron Plate there is a ſhank driven into the ends of the rails a, a.

Z, Z, Z, Z, Four Standards, or Legs, of the frame, each one foot ten inches long, four inches broad, and three inches thick.

a, a, The two Rails of the Frame: their extreme length is ſix feet three inches and an half; breadth, four inches; and thickneſs, three inches.

b, b, b, b, Four Tranſoms, each one foot nine inches and three quarters long, from ſhoulder to ſhoulder; and of the ſame breadth and thickneſs as the two rails a, a.

The Committee of Manufactures recommended this new-invented Reel, as worthy a Bounty of Forty Pounds; and the Society agreed to this Reſolution of the Committee, June 14, 1762.

END OF BOOK IV.

BOOK V.

MANUFACTURES;

COMPREHENDING

Short Deſcriptions of the Machines and Models in the Society's Repoſitory of Manufactures, not yet delineated.

CHAP. I.

A ſhort Deſcription of Mr. SAMUEL HAYWARD'S *new-invented* COMB-POT, *for Combing Wool.*

AS the Society has been always very attentive and ready to encourage uſeful Diſcoveries and Inventions, particularly ſuch as relate to Manufactures and Commerce, the joint Committees of Manufactures and Mechanics, were appointed to examine, very minutely, the new-invented Comb-pot, produced by Mr. Hayward;

Hayward; and, as there appeared to be ſeveral conſiderable improvements made to this uſeful Inſtrument, the Committee was extremely deliberate and circumſpect in their examination of it; and, after ſeveral Meetings and Conſultations with People of Experience and Judgment in this matter, it was concluded that the following Advantages will accrue from it; viz.

I. That a fire made in this Comb-pot, either with ſea coals, turf, or wood, will as effectually anſwer the purpoſe of combing wool, as charcoal; by which a conſiderable ſaving may be made in the expence of fuel.

II. This very eſſential operation in manufacturing wool is totally neglected in many towns and villages in this kingdom, either for want of charcoal, or on account of the great expence and difficulty in procuring it; it was therefore thought very probable, that when this uſeful diſcovery is made public, it will be the means of extending this and all other branches of the woollen manufacture in this kingdom.

III. That the combs are not fouled, or corroded, with ſmoke, ſoot, and ſulphur, as they are at every heat; (which is about ſix hundred times a day in common Comb-pots) neither is the wool ſeared, ſhrivelled, or ſmutted, by the exceſſive heat and foulneſs of the combs, as it frequently is by the method now in practice.

IV. That by the application of two concave iron plates, funnel, &c. a greater degree of heat is conveyed to the under pitch of the combs, and the ſharp and tender points of the broaches are defended from the flame and extreme heat, which, in common Comb-pots, for want of ſuch a contrivance, are fre-

 quently

quently heated red-hot, burnt and bent in many places, to the great prejudice of the combs and the wool.

V. That by this method of conveying a regular and proper degree of heat to the combs, the colour of the wool is preſerved, its curled and entangled fibres drawn out to a greater extent, and its ſtaple, by that means, conſiderably lengthened.

VI. That this improvement of the Comb-pot will be the means of preſerving the health and lives of many thouſand wool-combers, who, by the method now in uſe, are daily breathing the deſtructive fumes of charcoal, which enervates and impairs the ſtrongeſt conſtitutions, and renders the ſhort life they enjoy extremely miſerable.

The Committee was of opinion that Mr. HAYWARD's ingenious and uſeful invention was deſerving of a Bounty of Thirty Guineas. To which the Society agreed, April 18, 1763.

THE Society having been informed that our manufacturers of woollen, linen, and cotton, find it extremely difficult, in the ſummer ſeaſon, when the ſpinners are out at harveſt work, to procure a ſufficient number of hands, to keep their weavers, &c. employed; and that, for want of proper diſpatch in this branch of our manufactures, the merchants orders for all ſorts of piece goods are often greatly retarded, to the prejudice of the manufacturer, merchant, and nation in general; the Society therefore

therefore concluded, that an improvement of the Spinning-wheel would be an object worthy of their notice: accordingly, they publiſhed the following advertiſement, March 16, 1761. "For the beſt invention of a machine that will ſpin ſix threads of wool, flax, hemp, or cotton, at one time, and that will require but one perſon to work and attend it: (cheapneſs and ſimplicity in the conſtruction will be conſidered as part of its merit) for the beſt, Fifty pounds; for the ſecond beſt, Twenty-five pounds."

In conſequence of theſe premiums, ſeveral ingenious improvements have been made to the Spinning-wheel; but as neither of them effectually anſwered the purpoſe intended, the premiums were continued; and a machine for ſpinning ſix threads was produced by Mr. GEORGE BUCKLEY, and examined by the Committee of Manufactures, February 28, 1763.

CHAP. II.

A ſhort Deſcription of Mr. JOHN WEBB'S SPINNING-WHEEL.

THIS Wheel ſpins two threads, and reels at the ſame time: the wheel is ſixteen inches and three quarters diameter, and three quarters of an inch thick; with a groove on its periphery for the cords or bands which actuate the ſpindles, bobbins, and flyers; theſe movements are curiouſly made, and much improved, by this Candidate; the axis of the wheel turns in two wooden

ſliders,

ſliders, which occaſionally move up and down in a groove in each of the two ſtandard poſts, mortiſed into the bed of the machine; theſe ſliders regulate the tightneſs of the bands, by means of a wooden ſcrew inſerted into the bed of the machine; this ſcrew is connected to the ſliders, and is uſed for the purpoſe befor-mentioned. The treadle, crank, rod, &c. are well diſpoſed, and properly fixed to give freedom to the movements, and the ſpinner a full and ready command of them, on all occaſions. The Wheel is connected to the Spinning-wheel with a cord or band, which revolves round the nut of the Wheel and the nave of the reel; the tenſion of this band is regulated by a rod, or ſtick, two feet one inch long, and one inch diameter; the end of this rod is inſerted into a round hole in the bed of the Spinning-wheel, and the other end ſcrews into the ſtem of the reel, its nut, or female ſcrew, which ſerves to ſet the reel and Wheel at a greater or leſs diſtance from each other; by which means the cord, or band, is eaſily ſtrained, or looſened, at pleaſure: and the number of yards of thread ſpun and reeled, aſcertained by a ſignal given with a hammer, properly fixed for that purpoſe.

This Wheel was examined and worked in preſence of the joint Committees of Manufactures and Mechanics, who came to a Reſolution that Mr. WEBB was entitled to the Premium of Twenty Pounds, for his Spinning-wheel. To which Reſolution the Society agreed, March 25, 1761.

CHAP.

CHAP. III.

A ſhort Deſcription of Mr. THOMAS PERREN'S SPINNING-WHEEL.

THIS Machine is conſtructed on the principles of a common wheel, for ſpinning two threads of flax, or hemp, at the ſame time, by one perſon.

It was examined and worked in preſence of the joint Committees of Manufactures and Mechanics, who found it conſtructed on plain and ſimple principles; and, as it had been uſed with ſucceſs, and came well recommended by the Miniſter and Churchwardens of the Pariſh of Martock, in the County of Somerſet, the Committee came to a Reſolution to give the Second Premium, of Ten Pounds, to the ſaid Mr. THOMAS PERREN; and, as he had been at a conſiderable expence in bringing it to Town, and had been here on that account a long time, the Committee recommended it to the Society to give a farther Sum of Five Guineas. To which the Society agreed, March 25, 1761.

CHAP. IV.

A ſhort Deſcription of Mr. THOMAS PERREN'S LONGSHED SPINNING-WHEEL.

IT is commonly the work of two people to ſpin coarſe linen yarn with Longſhed Spinning-wheels; viz. one to draw out the flax,

flax, or hemp, and the other to turn the twifting-wheel; this Candidate has contrived a method of faving the expence of the latter, and, at the fame time, twift the yarn with more accuracy than can be done the ufual way: this is performed with a ftrong fafh-line which revolves round feveral pullies, as hereafter mentioned: on the axis of the twifting-wheel is fixed a conical wherrer, with three grooves for the fafh-line to run in; over this wherrer, about five feet from the ground, is fixed a fingle grooved pulley, ten inches diameter: two other pullies, of the fame dimenfions, are fixed to a poft at the farther end of the fhed, oppofite to the twifting-wheel, diftant therefrom about twenty yards; thefe pullies fupport, and give a proper direction to, the fafh-line, (whofe ends are fpliced together) which revolves, like a common jack-line, round the pullies before-mentioned.

The under limb of the line is conveyed off, at right angles from the conic wherrer, to an horizontal pulley fixed about ten or twelve inches from the left fide of the twifting-wheel; the upper limb is carried up, in an oblique direction from the faid wherrer, about five feet from the ground, where it revolves round a vertical pulley fixed over the horizontal pulley before-mentioned; both limbs of this line are turned off at right angles with the face of the twifting-wheel, and revolve round two vertical pullies fixed, one over the other, to a poft at the farther end of the fhed, or walk, and act in contrary direction to each other: this line is put in motion by a fmall iron pin faftened to its under limb and to a hook, or loop, tied round the waift of the fpinner; both limbs of the line run parallel with the floor, from one end of the fhed

to

to the other: the under limb is fixed at a convenient heighth from the ground for the ſpinner to lay hold of, and faſten thereto an iron pin, and the hook tied round the waiſt of the ſpinner; who, by that means, draws the line after her as ſhe walks backward to the end of the ſhed: by this ſimple contrivance the twiſting-wheel is put in motion, and the thread is ſpun and warped at the ſame time, without the aſſiſtance of any other perſon to turn the twiſting-wheel.

There is another line, or band, whoſe ends are ſpliced in the ſame manner as the former: this line runs in a groove in the twiſting-wheel, and gives motion to the ſpindles which ſpin the thread: the tenſion of this line is regulated by two wooden ſcrews fitted to the upper part of the frame of the machine. At the right ſide of the ſpinner, at each end of the walk, is fixed a poſt, with bars, or trundles, properly fitted to receive the warp, or thread, and leaſe.

This Machine was examined and worked in preſence of the joint Committees of Manufactures and Mechanics, who were of opinion that it was deſerving of the Firſt Premium of Thirty Pounds: to which the Society agreed, April 8, 1762.

CHAP.

CHAP. V.

A ſhort Account of Mr. GEORGE BUCKLEY'S MACHINE *for Spinning Six Threads at the ſame Time, by One Perſon.*

THIS Machine did not fully anſwer the purpoſe intended; but, as the principles on which it was conſtructed were very ſimple, and appeared to be very promiſing, and its parts and movements well adapted to perform their different operations with tolerable facility, the Committee was in great hopes that this deſireable improvement in the art of ſpinning would ſhortly be brought to perfection, therefore appointed a meeting, February 28, 1763, to examine the Machine brought in by Mr. BUCKLEY, for ſpinning ſix threads at one time; accordingly it was very minutely examined, and the Committee was of opinion that the Machine appeared to have a great deal of merit, and capable of improvements, although it was not ſo perfect as to deſerve the Firſt Premium of Fifty Pounds; but recommended to the Society to give the Inventor the Sum of Twenty-five Guineas, as an Encouragement for his Ingenuity. To which the Society agreed, March 25, 1763.

CHAP. VI.

A ſhort Deſcription of Mr. HARRISON's SPINNING-WHEEL.

THIS Wheel ſpins two threads at once, and is conſtructed as follows; viz. its baſis is a triangular frame on an inclined plane, to which is faſtened three ſtandards, or poſts, two in front, and one at its angular point, at the back of the frame: the two front poſts are twenty-one inches and an half long, and one inch and one-eighth ſquare; the back poſt is two feet ſix inches and an half long, two inches and an half broad, and one inch thick: the ſides of the triangular frame are two feet nine inches and an half long, two inches and an half broad, and one inch thick. There are two horizontal rails mortiſed into the upper ends of the two front poſts; theſe rails are twenty inches and a quarter long, one inch and a quarter broad, and one inch thick; diſtant from each other nine inches, from out to out: the ſpindles of the bobbins and flyers work ſide by ſide, and are fixed to thoſe rails in a perpendicular poſition. The Spinning-wheel is twenty inches diameter, and one inch thick; the under part of its iron axis is formed into a crank, whoſe radius is one inch and an half; its under end turns on a ſteel conic point, and is fixed to an angle of ſeventy degrees, by which means the Wheel revolves in an oblique direction, leaning towards the ſpinner, and is actuated by an horizontal wooden rod, connected with two iron center-pins to a perpendicular piece of wood mortiſed into the axis of the treadle, and to the crank

of the iron axis. On the upper ends of the two front posts are fixed two tin cups, each of them filled with a sponge and gum-water, for the spinners to wet their fingers when they find it necessary so to do. The flyers, bobbins, &c. are fixed to a small wooden frame hung with hinges, to one of the front standard posts; this frame serves to regulate the tension of the cords, or bands, of the Spinning-wheel, &c.

This Spinning-wheel was examined and worked in presence of the Committee of Manufactures, who was of opinion that Mr. HARRISON was entitled to the Premium of Fifty Pounds. To which the Society agreed, April 11, 1764.

CHAP. VII.

A short Description of Mr. THOMAS PERREN'S MACHINE *for Spinning, Doubling, and Twisting.*

THIS Machine is chiefly intended for workhouses, and is constructed in such a manner as to employ eight children, at the same time, either in spinning, or doubling and twisting: its frame, or stand, is a parallelogram, whose sides are five feet two inches long; its ends are twenty-one inches, from out to out; and height, from the ground, two feet three inches and an half: at each end of the frame is erected a short post, with an iron spindle driven tight into each of them, for the Spinning-wheels to turn on; these wheels are three feet six inches diameter, having a band, or line,

line, round each of them, which gives motion to the bobbins, flyers, &c. The wheels are turned with winches, of a convenient radius to be worked with eaſe by children: the poſts which ſuſtain the wheels are fixed three feet five inches diſtant from the ends of the frame, and are faſtened thereto with a ſtay, or brace, to the ſaid frame. The ſpinners ſit, three a breaſt, oppoſite to each other, on each ſide of the frame; and each of them may ſpin with one hand, or both, and has power immediately to ſtop, or put in motion, the ſpindles, flyers, &c. belonging to her own work, without any let, or hinderance, to the other ſpinners: this is performed by the preſſure of the foot on a treadle fitted for that purpoſe to each ſpinner's apparatus. On the upper part of the Machine, between the two ſets of bobbins, flyers, &c. are fixed ſix ſpiral ſprings, in a perpendicular poſition, and incloſed in a wooden caſe; which caſe extends from one of the end rails of the frame to the other, and is permanently fixed thereto with wood-ſcrews. Theſe ſprings are connected to the ſix treadles, and counter-act their motion, when the action of the bobbins, flyers, &c. has been ſtopped by the preſſure of the foot on the ſaid treadles. The large wheels, or firſt movers, are turned with eaſe by two children.

The Committee was of opinion that this Candidate was entitled to the Second Premium, of Twenty Pounds. To which the Society agreed, May 6, 1765.

CHAP.

CHAP. VIII.

A ſhort Deſcription of Mr. WILLIAM CRAGER'S MACHINE *for Winding and Doubling Woollen, Linen, or Cotton Yarn, &c.*

THE two principal parts of this Machine are the reels, or ſkeigners, and the ſpulls, or bobbins, &c. theſe are comprehended between two light triangular frames, or ſtands, on whoſe baſes are erected two perpendicular ſtiles, or pieces of wood, three feet and half an inch long, three inches broad, and one inch thick: the ſtiles and triangular frames are connected with two horizontal rails three feet three inches long, four inches and an half broad, and half an inch thick: one of theſe rails is faſtened to the bottom of the ſtiles, and the other to the upper part of the ſaid ſtiles: this upper rail ſupports a plancere, or wooden bed, to which the ſpulls, or bobbins, &c. are properly diſpoſed and fixed for the purpoſe intended. The ſpace under the plancere is divided with thin ſlips of wood into twelve equal parts, which contain twelve reels, or ſkeigners, fixed on ſeparate axes, which turn in a vertical direction, and are ſuſtained on the perpendicular thin ſlips, or partitions, before-mentioned. When the yarn is properly placed on the reels, or ſkeigners, their ends are carried up through twelve loops, or helixes, and laid over a ſmall round bearing-bar, fitted for that purpoſe on the bed of the Machine; and from thence conveyed, in a convergent direction, to two ſingle helixes, which ſerve to direct the yarn in ſuch a manner as to wind up obliquely on

on the ſpulls, and, at the ſame time, fill the ſpulls fuller in the middle than at their extremity. This operation of doubling and winding off from the ſkeigns is performed by a winch fixed to a wooden axis, on which are two wooden ſpur-wheels, eight inches diameter, with eighty teeth: theſe wheels give motion to two wooden pinions fitted to the ſpindles of the ſpulls.

The Committee examined this Machine, and, finding it had a great deal of merit, recommended to the Society to give the Inventor Ten Pounds, Part of the Premium of Seventy-five Pounds, on condition that he left the Machine as the Society's Property. To which the Society agreed, April 17, 1765.

CHAP. IX.

A ſhort Deſcription of Mr. JEREMIAH BURROW'S MACHINE *for Winding, Doubling, and Twiſting, Woollen and Cotton Yarn.*

THIS Machine conſiſts of two reels, ſeventeen inches in diameter, with eight rounds, or bars, in each: it turns on a wooden axis, to which is fixed a ſpur-wheel, nineteen inches diameter, with eighty cogs; this wheel is actuated by a lantern-wheel with eight trundles fixed on an iron ſpindle. The axis of the reels is ſupported by two perpendicular ſtandards, or pieces of wood, each of them twenty-three inches long, four inches broad, and one inch thick: theſe ſtandards are dove-tailed into the ends of the curved bottom and frame of the Machine; and, as before-

mentioned,

mentioned, ſuſtain the axis of the reels, and the iron ſpindles of the lantern-wheel, to whoſe ſpindles is fixed, alſo, a vertical crown-wheel, one foot diameter, with forty-four cogs; this wheel gives motion to an horizontal crown-wheel, one foot diameter, with thirty-three cogs on its upper ſurface. This horizontal wheel is one inch and an half thick, having a flat groove, one inch broad, on its periphery; round which revolves a leather ſtrap, or band, which turns the bobbins, ſpulls, &c.

This and the foregoing Doubling Machine conſiſt of ſeveral ingenious contrivances; but, as the Society's advertiſement concerning them was not fully expreſſed, the Machines produced were not ſo perfect as the Committee expected; however, as they appeared to have a great deal of merit, it was adjudged that each of the Candidates was deſerving of Ten Pounds, Part of the Premium of Seventy-five Pounds, on condition that the Machines were left the Property of the Society. This Reſolution of the Committee was agreed to by the Society, April 17, 1765.

CHAP. X.

A ſhort Deſcription of Mr. GARRATT'S MACHINE *for Spinning, Doubling, and Twiſting, Linen, Woollen, or Cotton.*

THE principal movements of this Machine are contained in a wooden frame, three feet high, two feet broad, and ſeventeen inches deep. The firſt mover is a wheel twenty inches diameter, and one inch and an half thick, with two grooves and bands on its periphery; on the axis of this wheel is fixed a curved

arm,

arm, or crank, whoſe radius is four inches; which is connected to the treadle by means of a perpendicular wooden rod, which actuates the wheel by the preſſure of the foot on the ſaid treadle: on the middle of the axis is an endleſs ſcrew, which gives motion to an eſcew wheel, ſix inches diameter; on whoſe arbor is fixed two reels, to wind off the yarn and the worſted, after ſpinning and twiſting. On the top of the frame, in front, are fixed two ſpindles, flyers, &c. for ſpinning; and on the back part there are two ſpindles, or ſpulls, for twiſting: in the middle of the frame there is a dial, or index, to ſhew the number of yards reeled into ſkeigns.

The Committee reſolved that Mr. GARRATT was entitled to Thirty Pounds, part of the Firſt Premium. To which the Society agreed, April 9, 1766.

CHAP. XI.

A ſhort Deſcription of Mr. WILLIAM GARRATT'S MACHINE *for Doubling and Twiſting Yarn, &c.*

THIS Machine is conſtructed much on the ſame principles as Mr. GARRATT'S Spinning-wheel; but, inſtead of having two ſpindles for ſpinning, and two for twiſting, this has four ſpindles for twiſting only; and theſe are placed ſide by ſide, in an horizontal direction, in the fore-part of the Machine; on whoſe upper rail is erected a wooden frame, three feet five inches ſquare: this frame

is

is divided into twelve equal parts, or diviſions, containing twelve ſkeigns of yarn; each of which ſkeigns revolves in a vertical direction round two bobbins, whoſe pivots turn in the perpendicular bars of the partitions, and may, occaſionally, be ſet at a greater or leſs diſtance from each other, according to the length of the skeign. The yarn is wound off from the ſkeigns upon four bobbins, having firſt paſſed through the eyes, or holes, in the ſpindles and flyers, to which they are directed by four wire loops, or helixes; and the number of yards reeled are aſcertained by a dial, in the ſame manner as they are in Mr. GARRATT's other Machine.

This operation is performed by the preſſure of the foot on the treadle, which gives motion to the twiſting-wheel, &c.

The Committee of Manufactures examined this Machine, and recommended to the Society to give this Candidate Twelve Pounds, part of the Premium of Twenty-five Pounds; on condition of his leaving his Machine the Property of the Society: which was agreed to, April 9, 1766.

CHAP. XII.

A ſhort Deſcription of the Reverend Mr. PULLEN's SILK-REEL.

THE Society having thought proper to encourage the culture of ſilk in our Colonies, by conſiderable premiums, the Reverend Mr. PULLEN was ſo obliging as to preſent the Society with

with a ſhort account of the culture and management of ſilk worms, together with a model of his ſilk-reel, the utility of which he has ſet forth in a letter to the ſociety, February 6, 1758; a copy of which letter, as far as it relates to the Reel, is as follows.

" The machine before you is a model ſhewing a new conſtruction which I have given to the Silk-reel; in which I have,

" Firſt, reduced it to the ſimplicity of having but two wheels inſtead of four, as is the preſent uſage.

" II. I have fixed ſuch a proportion, that the moiſt thread of ſilk ſhall not fall lengthwiſe on another, till after the reeling of ſix hundred yards; whereas it commonly falls on it after about an hundred and fifty, and before it has time to dry.

" III. I have given an eaſy method of reeling the ſilk with a double croſſure, inſtead of the ſingle one, by which means the thread is more dried and embodied, ſo as to be fit for making into organies, or warp. Before I end, I muſt offer one obſervation; viz. that, whenever great quantities of ſilk are produced in our American Colonies, it muſt be the work of private families: public filatures may begin, and ſet a good example, but cannot produce great quantities of ſilk: it is therefore hoped that the making Silk-reels of a more eaſy and ſimple conſtruction, will be an inducement to bring private families into the uſe of it.

" I am, Gentlemen, your moſt obedient,

" Humble ſervant,

" SAMUEL PULLEN."

CHAP. XIII.

A SILK-REEL *presented to the Society by* JOHN POWNAL, Esq.

THIS Reel was brought from Georgia, where such Reels are now in use in private families; its frame, or basis, is a parallelogram, supported on four legs, five inches and a quarter long; its side rails are two feet eleven inches long; the end rails are fifteen inches and a quarter long, one-third of an inch broad, and one inch and a quarter thick: at each end of the side-rails, is erected a round pillar, or post, fourteen inches long, and one inch and an half diameter. The axis of the Reel turns in the heads of the two front pillars. The guide-stick passes through a hole in one of the back pillars, and is actuated by a vertical spur-wheel (the first mover) two inches diameter, with twenty teeth, fixed on the inner end of the axis of the Reel: this wheel gives motion to a vertical crown-wheel (the second mover) which is two inches diameter, with twenty teeth: this crown-wheel is fixed to a wooden shaft, or axis, two feet two inches long, and one inch diameter; its pivots turn in the side pillars at the back of the frame: at the inner end of the shaft is fixed another vertical crown-wheel (the third mover) two inches diameter, with twenty-four teeth, which gives motion to an horizontal crown-wheel (the fourth mover) two inches diameter, with twenty-four teeth; on the apex of this wheel is fixed a curved iron arm, or crank,

crank, which gives a progreſſive and regreſſive motion to the guide-ſtick; by which means the ſilk is laid in an oblique direction on the Reel, whoſe bearing bars are fifteen inches long, and its circumference three feet two inches.

CHAP. XIV.

A ſhort Deſcription of Mr. WHYMAN'S STOCKING-FRAME.

THIS Machine conſiſts of four ſtandard poſts, framed together with ſubſtantial ſills, rails, and braces. The two back poſts which ſuſtain the Machine are four feet long, four inches broad, and two inches thick. The two front poſts, which comprehend the treadles and ſupport the hoſier's ſeat, are two feet two inches long, and three inches ſquare; the diſtance from the fore edge of the ſeat, to the back edge of the hind poſt, is two feet two inches.

The ſlur-wheel is fourteen inches diameter, and one inch and an half broad on its periphery, and is connected to the ſlur-box pullies with a ſmall cord.

On the axis of this wheel is fixed a roller five inches and an half diameter, round which there is a ſtrong cord with which the two outermoſt treadles are connected to the ſlur-wheel and ſlur-box pullies, &c. The middle treadle is connected to the preſſer-bar with an iron rod, leather ſtraps and a pulley, much in the ſame manner as in common Frames.

The

The needles, ſinkers, jacks, &c. are formed nearly in the ſame manner as in common Stocking Frames, but are diſpoſed of and fixed ſomewhat different.

The wrapper-ſcrews are placed in the front of the frame; and the ſtay, ſpring-bar, and ſprings, are fixed on the upper part of the frame, behind the jacks.

The hanging-joints and balance-bars are properly and conveniently fitted for the purpoſe intended.

The gage of this Frame is made with twenty-two ſinkers to an inch: it was worked in preſence of the Committee of Manufactures, who was of opinion that it deſerved the whole Premium of One Hundred Pounds. To which the Society agreed, April 16, 1766.

END OF BOOK V.

BOOK VI.

MANUFACTURES.

CHAP. I.

Premiums and Bounties for Employing the Poor in Pariſh Workhouſes.

THE management and employment of the poor in different branches of the woollen, linen, and cotton manufactures, in pariſh workhouſes, having been conſidered by the Society for the Encouragement of Arts, Manufactures and Commerce, as an object worthy of their notice, they, with great candour, peruſed a plan drawn up for that purpoſe by Mr. William Bailey; and, as an encouragement for him to publiſh the ſaid plan, gave him a gratuity of Fifty Pounds; and, at the ſame time, ordered the following Advertiſement to be publiſhed in the News-papers.

Strand,

Strand, May 24, 1758.

Notice is hereby given, that the Society for the Encouragement of Arts, Manufactures, and Commerce, will give the under-written Premiums to ſuch Pariſhes as ſhall, either ſeparately, or jointly, ſet up, open, or regulate Workhouſes, for the Relief and Employment of the Poor, upon the Plan lately printed, and publiſhed by Mr. WILLIAM BAILEY; *and as ſhall, before the Third Wedneſday in February,* 1760, *lay before the Society, in Writing, an Account, or Narrative, of their Proceedings; with ſuch Remarks as their Experience, in the Execution of the ſaid Plan, ſhall point out as Material.*

In conſequence of which advertiſement, ſeveral workhouſes were ſet on foot, and the following premiums paid to the ſuperintendents of the workhouſes hereafter mentioned: viz.

March 7, 1759. To Mr. John Sculford, ſuperintendent of the workhouſe of St. Dunſtan's in the Weſt, for woollen yarn, ſpun by the poor in the ſaid houſe, - - - - £.15

To Mr. Robert Price, ſuperintendent of St. Luke's workhouſe, for linen yarn, ſpun by the poor in the ſaid workhouſe, £.10

To Mr. William Hay, ſuperintendent of the workhouſe at Lutton, in Bedfordſhire, for cotton yarn, ſpun by the poor in the ſaid houſe, - - - - - - - £.10

March 26, 1760. To Mr. Neal, ſuperintendent of the workhouſe at Cheſhunt, Hertfordſhire, for woollen yarn, ſpun by the poor in the ſaid workhouſe, - - - - - - £.12

To Mr. Leonard Snowden, ſuperintendent of the workhouſe at Clerkenwell, for woollen yarn, ſpun by the poor in the ſaid workhouſe, - - - - - - £.8

March

March 25, 1761. To Mr. Thomas Perren, ſuperintendent of the workhouſe at Plymouth, Devonſhire, for linen yarn, ſpun by the poor in the ſaid workhouſe, - - - - £.20

1762. To Mr. John Vaux, for ſpinning fine linen yarn, 30

Premiums and Bounties paid for Spinning fine Linen Yarn, beſides what were paid to the Superintendents of Workhouſes.

1761.	To Mr. Samuel Wilſon, for fine linen yarn,	£.5	5
1762.	To Mr. Samuel Wilſon, for ditto, -	5	5
1763.	To Mrs. Hannah Dunſton, for ditto -	5	5
1764.	To Mrs. Hannah Dunſton, for ditto, - -	8	8
	To Mrs. Elizabeth Biſhop, for ditto, -	5	5
1765.	To Mrs. Elizabeth Biſhop, for ditto, -	5	5
1767.	To Mrs. Elizabeth Biſhop, for ditto, - -	12	12

CHAP. II.

A ſhort Account of the Advancement of the CARPET MANUFACTORY.

THIS Manufacture is brought to ſo great a degree of perfection in this kingdom, that we actually excel in this valuable branch of the woollen manufacture, which is now become a very conſiderable article of commerce; and, inſtead of importing Carpets from abroad, we now export great quantities of them to foreign countries: and, as the Society's premiums and bounties

have

have been liberally given for improvement in this art, it is now well eſtabliſhed in this metropolis, and many other parts of England; where it furniſhes employment for a great number of poor, and is the occaſion of working up a prodigious quantity of coarſe wool, which, heretofore, was applied to purpoſes of much leſs value to the Manufacturers, and the public.

The principal Manufacturers who obtained Premiums for this Article, were, Mr. Moore, of Chiſwell-ſtreet, London; Mr. Witty, of Axminſter, Devon; Mr. Paſſavant, of Exeter, Devon; and Mr. Jefferies.

CHAP. III.

Premiums for DRUGGETS *of a particular Fabric for Foreign Markets.*

IT is well known that the Engliſh Druggets are preferable to any made in Europe; but, notwithſtanding their ſuperior merit, there is wanted a particular ſort of thin ſlight Druggets for foreign markets; the length of which pieces is thirty yards, and their breadth twenty-one inches, at leaſt.

The Manufacturers, who obtained Premiums for this ſort of Goods, were, Mr. Williams and Co. Cornwall; Mr. Walker, of Barnſtaple, Devon; Mr. James Maynard, of Honiton, Devon; Mr. Pike, of Exeter, Devon; and Mr. John Maynard, of Honiton, Devon.

CHAP.

CHAP. IV.

Premiums for PAPER *for* COPPER-PLATE PRINTERS.

IT having been repreſented to the Society, that the copper-plate printers are in want of a particular ſort of thick ſpungy Paper, like that which is imported from France, the Society thought it an object worthy of their notice; accordingly, they offered ſeveral conſiderable Premiums for the beſt Engliſh Paper fit for Copper-plate Printers, and neareſt in quality to that which is imported from France; in conſequence of which Premiums, ſeveral ſpecimens were produced, and approved of by the Committee of Manufactures, who were of opinion that the Candidate, Mr. Thomas Cooke, of Tottenham, was entitled to the Premium of Twenty-five pounds, for Paper produced in the year 1763; and the like ſum for the ſame quantity of Paper produced in the year 1764.

CHAP. V.

Premiums for SILK PAPER.

THE Society having been informed that there is a very valuable Paper made of Silk rags, they came to a reſolution to offer Two conſiderable Premiums for the encouragement of this Manufacture; in conſequence of which there were produced ſeveral parcels of Silk Paper, of different colours, and of a texture equal to what is imported from abroad.

The Candidates for this Manufacture were Mr. Taylor, of Wrotham; Mr. Quitch, of Dartford; Mr. Stiles; Mr. Symons, of Haſelmoor; Mr. Chapman; Mr. Croſs; Mr. Cole; and Mr. Baſkerville, of Birmingham.

CHAP. VI.

The Method of making IMBOSSED PAPER, *diſcovered and brought to Perfection by Mr.* BENJAMIN MOORE, *of* Newgate-ſtreet, London.

SEVERAL ingenious people have attempted to diſcover the art of making Imboſſed Paper, in imitation of that which is imported from abroad; but it is not known that any perſon has brought it to a tolerable degree of perfection, except Mr. Moore; who, by repeated experiments and great expence, has acquired a method of making it with great accuracy, and in all reſpects equal to what is imported from foreign countries. Several ſpecimens of this ſort of Paper were produced to the Society, and referred to the Committee of Manufactures; who was of opinion that the ſpecimens produced were equal, if not preferable, to any foreign Imboſſed Paper; they, therefore, recommended to the Society to give Mr. MOORE a Bounty of Fifty Pounds, for the Diſcovery and Improvements he had made in this Manufacture: to which the Society agreed, March 21, 1764.

CHAP. VII.

Premiums for making MARBLE PAPER.

AN account having been laid before the Society of the great quantity of paper, commonly called Marble Paper, imported into this kingdom, from foreign countries, the Society came to a reſolution to offer a Premium of Fifty Pounds to the Candidate who ſhould produce Forty Ream of the beſt, and neareſt in quality to foreign, Marble Paper; and a Premium of Twenty-five Pounds to the Candidate who ſhould produce Twenty Reams of ditto, manufactured in England.

The Candidates, who obtained theſe Premiums, were, Mr. Henry Houſeman, of Endfield, and Mr. Samuel Hervey, June 29, 1763.

CHAP. VIII.

Premiums for making LOSH *or* BUFF LEATHER.

THE Society having been informed that there were no Loſh Hides, commonly called Buff Leather, dreſſed in England; and that there were annually imported, at a medium, one thouſand and twenty-ſeven Loſh Hides for the uſe of the army; the Society thought this an object worthy of their notice; accordingly, they offered a Premium of Ten Pounds to the perſon who ſhould pro-

duce

duce Five of the beſt Loſh Hides dreſſed in oil, and equal in goodneſs to foreign Buff Leather.

In conſequence of which Premium, Mr. Bullock, Mr. Gabel, Mr. Becket, and Mr. Colwell, were Candidates, and the Hides produced by them were examined and allowed to be equal in goodneſs to any imported from abroad, and in all reſpects, fit for the uſe of the army.

N. B. One of the Hides is reſerved in the Society's Repoſitory of Manufactures.

CHAP. IX.

LEATHER *Tanned with Oak Saw-Duſt.*

THE method of Tanning ſheep, calf, and lamb ſkins, without bark, was diſcovered by Mr. John Eldridge, of Battle, in Suſſex; who, by repeated experiments, had brought to perfection the Tanning of Leather with Oak Saw-duſt; and, as he thought it would prove a matter of public utility, he offered, for a valuable conſideration, to reveal his ſecret to the Society, and to perform the operation before any perſon, or perſons, whom the Society ſhould think proper to ſee the proceſs: which, accordingly, was performed in preſence of the joint Committees of Chemiſtry and Manufactures; who attended, examined, and took minutes of the whole proceſs, which proved to the entire ſatisfaction

tion of the ſaid Committee; they, therefore, recommended to the Society to give Mr. Eldridge a Bounty of One Hundred Pounds for his diſcovery. To which the Society agreed, May 23, 1764.

CHAP. X.

The Method of dyeing Leather Red and Yellow in the Manner it is practiſed in Turky, *communicated to the Society by Mr.* PHILIPO.

SOME years ago, two worthy members of the Society having an intimacy with Mr. Philipo, (who is an Arminian) requeſted him, when he returned next to Aſia, to endeavour to diſcover the Turkiſh method of dyeing goats ſkins Red and Yellow: this was looked upon as a very hazardous attempt; nevertheleſs, Mr. Philipo having a very great regard for the Engliſh nation, and particularly for the two gentlemen above-mentioned, he, with great aſſiduity and expence, acquired a perfect knowledge of the art: accordingly, at his return, in the year 1766, he diſcovered to the Society the method of Dyeing Leather Red and Yellow, in the ſame manner, and with the like ingredients, as it is done in Turky. The operation was performed by Mr. Philipo, himſelf, at the Society's office, in preſence of the joint Committees of Chemiſtry and Manufactures, who took minutes of the whole proceſs; and when the ſkins were completely finiſhed, ſeveral experiments were tried

to

to prove the durability of the colours, which were found to be better fixed, and more beautiful, than the ſkins brought from Turky: the Committee was, therefore, of opinion, that Mr. Philipo was deſerving of a Bounty of One Hundred Pounds and a gold medal for his diſcovery, and for the great trouble and expence he had been at. To which reſolution the Society agreed, November 18, 1767.

N. B. Several ſpecimens of the Leather are preſerved in the Society's Repoſitory of Manufactures.

CHAP. XI.

Linen, Woollen, Silk, and Cotton, Quilted in the Loom, in Imitation of Marſeilles *and* Italian *Quilting.*

THE advancement of the art of Quilting in the Loom is very extraordinary: this new and uſeful manufacture was invented by a poor obſcure journeyman weaver, whoſe views, at firſt, extended no farther than to make a ſmall quantity of it for the uſe of his wife and children; but, before it was made into garments for them, it was ſhewn, as a matter of curioſity, to a gentlewoman, who (two years after) mentioned it to the author of this book; and he, apprehending it might be an object worthy of the Society's notice, with great difficulty, found out the ingenious inventor; of whom he procured a ſmall piece of the ſaid Quilting, which was produced to the Society, whoſe liberal premiums and bounties

bounties have been the means of bringing this manufacture to a ſurprizing degree of perfection; and, as it is extremely beautiful, cheap, and durable, there is now a very great demand for it, both for home conſumption and for exportation. The manufacturers, who obtained premiums for it, were, Mr. Humphrey Slim, of Friday-ſtreet, London; Mr. Joſeph Shaw, of Belton, in Lancaſhire; Mr. Nicholas Badge, of Spital-fields; Mr. Benjamin Slim, of Old-ſtreet, London; Mr. Jonathan Baker, of Spital-fields; Mr. Nicholas Pearcal, of Kidderminſter; Mr. John Parrock, of Spital-fields; Mr. Jonas Clifton, of Shoreditch, London; Mr. Obediah Rider; and Mr. Joſiah Barnes.

N. B. Specimens of the different ſorts of Quilting are preſerved in the Society's Repoſitory of Manufactures.

CHAP. XII.

Premium for Tinning Braſs and Copper Veſſels.

IT is well known that braſs and copper veſſels, not properly Tinned, will ſoon ruſt and canker, therefore vaſtly improper for the reception of any liquid or ſolid matter, made uſe of for victuals, &c. and as it has been found by experience that grain tin is the moſt proper material for Tinning ſuch veſſels, the Society (in the year 1755) offered a Premium of Ten Pounds to the perſon who ſhould produce the largeſt braſs or copper veſſel, containing

taining not leſs than thirty gallons, Tinned, in a workman-like manner, with pure grain tin; without lead, or any other alloy whatever.

The Candidate who obtained this Premium was Mr. John Bootie, of Church-court, St. Martin's-lane, London.

CHAP. XIII.

Premiums for POINT LACE.

IT having been ſuggeſted to the Society that there are, in foreign countries, a great number of women and girls employed in making Point Lace, and that great quantities of ſuch Lace are annually imported into this kingdom; the Society, therefore, came to a reſolution to offer ſeveral premiums for this article, with a view of bringing it to the greateſt degree of perfection in this country, and of employing our own people, and circulating, among them, the large ſums of money which we pay for it to foreigners.

In conſequence of the ſaid premiums, many ſpecimens of Point Lace were produced; and the candidates, hereafter mentioned, obtained premiums for their curious performances: Miſs Eſther Bootie, of Church-court, St. Martin's-lane; Miſs Mary Baker, of Hareſtone, Leiceſterſhire; Miſs Mary Bootie; Miſs Maria Dalles, of Coleman ſtreet; Miſs Lydia la Croy, of Monmouth; and Mrs. Theodoſia Bourgeois, of Derby.

CHAP. XIV.

Premiums for THREAD LACE.

IT having been diſcovered that a very curious manufacture of Thread Lace has been made with knitting-needles; and that a great variety of flowers, and patterns of various ſorts, may be formed with knitting-needles; the Society offered a premium of Thirty guineas, to the perſon who ſhould produce the greateſt quantity of clear, fine Lace, of this ſort, not leſs than ſix yards in length, and two inches and an half in width.

The candidates for this premium, were, Miſs Boulton, of Dean's court, St. Martin's le Grand; Miſs Whiteſide, of Lancaſter; and Miſs Gordon, of Folkſtone, Kent.

CHAP. XV.

Premiums for CHIP HATS.

AS Chip Hats were, ſome time ſince, imported in great quantities from Italy, a worthy member of the Society was very aſſiduous in procuring proper information, in every reſpect, relating to this affair; and, as it appeared that we annually paid

very conſiderable ſums to foreigners, for this manufacture, and that it furniſhed employment for a great number of women and children; the active member, above-mentioned, repreſented it to the Society, as an object worthy of their notice: accordingly, it was taken into conſideration, and the manufacture encouraged, by premiums and bounties, ſeveral years following; and the candidates who obtained them, are as under written:

Mrs. Mayer, and

Mr. Benjamin Slim, of Old-ſtreet, London.

CHAP. XVI.

Various Sorts of Materials taken from the Stem of the Planting-tree, and Manufactured into CORDAGE, GAUZE, BLOND-LACE, KNITTING, CANDLEWICKS, *&c.*

THE Society having received, from Mr. Hanway, a ſample, of a fabric equal to very fine cambric, or lawn, manufactured, as is ſuppoſed, (at Zoar, one of the Philipine Iſlands) from the fibrous matter of the planting-tree.

This curious production was laid before the Society, together with ſpecimens of three different ſorts of materials taken from the ſtem of the planting-tree: the firſt, in appearance, is like hemp, or coarſe flax, the ſecond like hard ſilk, and the third like cotton.

Theſe

Theſe materials were worked, by Mr. William Bailey, into the various ſorts of manufactures, beforementioned: and, as the Committee of Manufactures was of opinion that the importation and manufacturing of the ſaid materials were highly worthy of the attention of the Society, ſeveral large premiums were offered, to excite our ingenious manufacturers to try what advantage could be made of this diſcovery; but, as there has hitherto been only one very ſmall parcel of the raw materials imported, and that greatly damaged, no further advances have been made in this affair.

CHAP. XVII.

Bounties for STRINGS *for Muſical Inſtruments.*

IT has been intimated ſeveral times to the Society, that the making ſtrings for muſical inſtruments would be the means of employing a great number of hands, and of circulating conſiderable ſums of money among our own people: the Society, at firſt, thought this too trifling an affair to come under their conſideration; but, on further enquiry, found, that the ſums annually paid to foreigners, for this article, very greatly exceeded what they at firſt apprehended; it was therefore thought adviſeable to procure a proper perſon, or perſons, to ſet on foot a manufacture of catgut, (as it is called) in this metropolis: accordingly, by the aſſiſtance

of

of an Italian muſician, a man and a woman were procured, who had been ſeveral years employed in this buſineſs, and ſo well underſtood it as to carry on, in ſome remote part of the town, a ſmall manufacture of ſheep and lambs guts, for muſical inſtruments and other purpoſes; and, as a proof of their abilities, produced ſeveral ſpecimens of Fiddle Strings, of their own making, which appeared equal in goodneſs to what are called Roman ſtrings: nevertheleſs, it was required that they ſhould make a trial of their ſkill in this manufacture, at the Society's office, in preſence of the joint Committees of Chemiſtry and Manufactures: this they readily complied with; and, according to appointment, the whole operation was performed, to the entire ſatisfaction of the Committee; and, before they left the room, the Strings made in their preſence were dried, put into an inſtrument, and played upon; and, by proper judges, allowed to be equal in tone and goodneſs to what are imported from Italy: on which, each of the candidates had Six Guineas given them, as a reward for their trouble.

N. B. The Regiſter of the Society has been informed that this manufacture is now carrying on, with good ſucceſs, by other people, in ſeveral parts of the town.

CHAP.

CHAP. XVIII.

Premiums for Crimping CRAPES *for Mourning Hatbands, &c.*

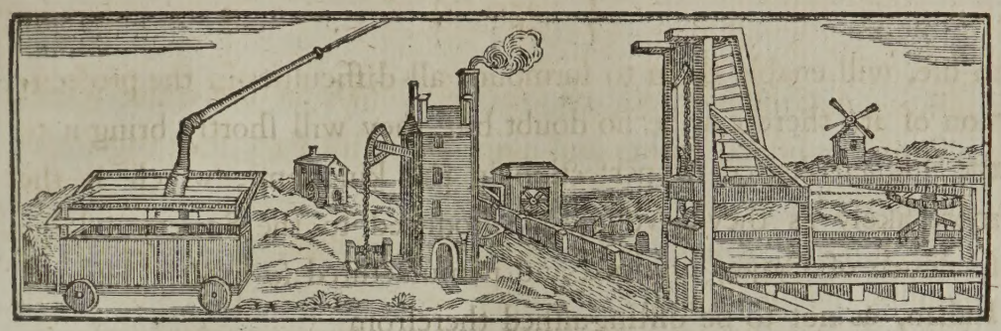
THE Italian method of Crimping Crapes has been attempted by many of our ingenious ſilk manufacturers, and others; but as yet it does not appear that any material advancement has been made in this art; and, as there is a great quantity of it imported into this kingdom, the Society thought it an object worthy of their notice: accordingly, they offered, three years following, large premiums for the greateſt quantity of Engliſh Crimped Crape for mourning; not leſs than an hundred yards, and neareſt in quality to the Italian Crape.

There were three candidates for this premium; but, as they did not produce the quantity required by the Society's advertiſement, neither of them was entitled to the premium: one of them, indeed, has been at a conſiderable expence in this affair; and has been twice to Naples, on purpoſe to make himſelf maſter of the art of Crimping Crapes; and, by the ſpecimens he produced, it is very evident that he has diſcovered the right method of doing it: as he is engaged in ſeveral other branches of the ſilk manufacture, it is probable it would have been ſome years before he could have eſtabliſhed a manufactory of it in this country; but as this affair is now taken up by two gentlemen who are indefatigable in the purſuit of it, and whoſe circumſtances, ſpirit, reſolution, and ſtation

in

in life, will enable them to ſurmount all difficulties in the proſecution of it, there can be no doubt but they will ſhortly bring it to the higheſt degree of perfection in this kingdom; which is the more likely as they have already produced to the Society a large ſpecimen of Crape, crimped and manufactured ſo exactly like the Italian, as not to be diſtinguiſhed therefrom.

END OF BOOK VI.



BOOK VII.

MECHANICS;

COMPREHENDING

Deſcriptions and Explanations of ſuch of the Society's Machines and Models, in Mechanics, as are repreſented in the Copper-plates hereunto annexed.

CHAP. I.

A Deſcription of Mr. STANSFIELD'S *Model of a* SAW-MILL.

PLATE I. FIG. 1.

A perſpective View of Mr. STANSFIELD'S SAW-MILL.

A, A Water-wheel, eighteen inches in diameter, and five inches and an half on the periphery, carrying twenty-four buckets. Its ſhaft is two feet nine inches long, from ſhoulder to ſhoulder, and two inches and ſeven-eighths ſquare.

B,

B, A Crown-wheel, on the ſame ſhaft as the water-wheel. its diameter fifteen inches and a quarter, with ſixty-four cogs. See Plate II. Fig. 2.

C, A Lantern-wheel, ſix inches in diameter, with twenty-four trundles.

D, A Triple Crank, or Axis of the Lantern-wheel. Its extreme length is twenty-three inches, thickneſs one inch and an half. The radius of the Crank is one inch and an half. See Plate II. Fig. 2.

E, E, E, Rods, or Lifters, connected to the crank and ſaw-frame, No. 1. On the upper end of theſe Rods is a croſs rail, with an iron gudgeon at each end: the gudgeons paſs through, and turn in, two holes in the under ends of the ſaw-frame. The two other ſaw-frames are connected with the crank, or axis, of the lantern-wheel, in the ſame manner. See Plate II. Fig. 2.

F, A Ratchet-wheel, ſeven inches and an half diameter, with an hundred and twenty teeth. This Wheel is a thin rim or plate of iron, ſcrewed to the ſide of a grooved wooden roller, or barrel, which, with the pinions, revolves with the iron axis, and actuates the rack, carriage, frame, &c.

G, A Lever, nine inches and a quarter long, ſeven-eighths of an inch broad, and half an inch thick. One end of this Lever turns on an iron pin in the poſt, near the letter G: the other end paſſes through a ſtaple fixed to one of the ſtiles of the ſaw-frame, No. 1. To this Lever are fixed two iron hooks, one of which, at every elevation of the ſaw-frame, gradually moves the ratchet-wheel, grooved roller, &c. the other hook ſerves to ſtop the wheel from

from going back. N. B. The outer hook is occaſionally ſet nearer to, or further from, the fulcrum, or center-pin, of the Lever, in order to regulate the motion of the carriage-frame, in proportion to the cuts made with the ſaws at every ſtroke.

H, H, H, Three Saw-frames, marked 1, 2, 3. Their extreme length is one foot ten inches and an half. The breadth of the ſtiles is ſeven-eighths of an inch; thickneſs, five-eighths. The diſtance between the ſtiles is five inches and three-eighths. N. B. Each of the Saw-frames, and carriage-frames, is furniſhed with a ratchet and grooved roller, or barrel, together with its levers, hooks, winches, lines, pullies, &c.

I, I, I. Three Carriage-frames, two feet ſeven inches and three quarters long, and five inches broad, from out to out. In the middle of each of the Frames is fixed an iron rack, which is actuated by a pinion on the iron axis, as before-mentioned.

K, K, Two Winches, with their rollers, lines, and pullies, for drawing back the carriage-frames.

L, A Lever, nineteen inches and a quarter long, with an iron hook, which, by ſlow gradations, turns the ratchet-wheel the length of one tooth, at every elevation of the ſaw-frame, No. 3. on which the end of the Lever bears. See Fig. 1. and 8.

M, A Ratchet-wheel, with its click, barrel, lines, &c. This Wheel is four inches diameter, with forty teeth. The barrel is one inch and an half diameter, and ſix inches and a quarter on its periphery: to this is faſtened, and wound up, a line, or rope. It is alſo faſtened, and properly connected, to the pullies and crane. See M, Fig. 8.

N, A Crane, whoſe radius is fifteen inches and an half; this Crane, with its blocks, pullies, &c. ſerves to take up the ſtocks, and convey them to the carriage-frames to be ſawed.

O, A Wooden Hook, which turns on a center-pin, in a ſhort poſt erected on the upper end of the mill-frame. This Hook ſerves to keep the crane in its place, whilſt the ſtocks are drawing up. See Fig. 8.

P, A Saw, nine inches and an half long. This Saw is intended only for croſs-cutting the ſtocks.

Q, A Sliding Valve, in which there is a long mortiſe, or aperture, to direct the ſaw as it moves up and down

R, A Lever, two feet long, one inch and an half broad, and one inch and one-eighth thick. One end of this Lever paſſes through a ſtaple, or plate of iron, ſcrewed to the lower end of the ſtile of the ſaw-frame, No. 2. the other end of it is connected with the handle, or ſtem, of the ſaw, having a center-pin paſſing through the end of the Lever and ſtem.

S, A Leaden Weight, Line, and Pullies, which ſerve to preſs the ſaw forward as it enters the wood.

T, T, T, Three ſhort Poſts, ſeven inches long, and ſeven-eighths of an inch ſquare, erected on three ſills, or ſhort pieces of wood, faſtened to the under rails of the mill-frame: there is an horizontal arm mortiſed into the upper end of each of theſe poſts; and the ſtock, or plank, to be croſs-cut, is to be laid on the three ſills, marked 1, 2, 3. The ſtock is fixed cloſe to the three ſhort Poſts, and faſtened thereto with wedges, properly fitted to drive in between the ſtock and the arms of the Poſts.

V, V, &c.

V, V, &c. Short Poſts, two inches and three quarters long, one inch and one-eighth broad, and three-eighths of an inch thick, with nine holes in each of them. Theſe poſts are mortiſed into the outſide rails of the outſide carriage-frame, and ſerve to faſten the ſtocks to the frames by means of an iron crow paſſing through the holes; between which crow and the ſtock is driven a wedge, or wedges, to fix the ſtock to the carriage-frame. See Fig. 1. and 5.

W, W, W, Three Iron Racks, faſtened to the carriage-frames, and actuated by the pinions b, b, b. See Plate III. Fig. 5. and Plate IV. Fig. 6. and 7.

X, X, &c. Friction-rollers, on which the middle carriage-frames paſs and repaſs.

Y, Y, &c. Short Studs, or Tenons, faſtened to the floor; their uſe is to keep the carriage-frames ſteady, and in a ſtraight direction.

Z, A Stock of Wood, properly fixed to be croſs-cut to any ſcantling.

PLATE II. FIG. 2.

A Geometrical Elevation of the Saw-Frames, Wheels, Cranks, Lifters, &c.

B, The Crown-wheel, with ſixty-four cogs, faſtened to the ſame ſhaft as the water-wheel. See Fig. 1.

C, The Lantern-wheel, with twenty-four trundles.

D, D, D,

D, D, D, Three Cranks.

E, E, E, Three Rods, or Lifters, actuated by the three cranks, which give motion to the ſaw-frames.

F, F, F, Three Ratchet-wheels, on whoſe iron axis are three grooved barrels, marked a, a, a, and three iron pinions b, b, b. The pinions are three-eighths of an inch in diameter, with eight teeth. Each of theſe pinions gives motion to the racks faſtened to the carriage frames, and gradually brings them forward by means of the levers, hooks, and Ratchet-wheel. See F, G, Fig. 1.

H, H, H, Three Saw-frames, &c.

a, a, a, The Barrels, or Grooved Wheels.

b, b, b, Three Pinions, on the ſame axis as the Ratchet-wheels, and grooved wheels. See deſcription of h, Fig. 5.

c, c, c, Three Iron Staples, through which the levers paſs, as before-mentioned.

PLATE II. FIG. 6.

A perſpective View of one of the Saw Frames, with its Levers and Hooks, connected with the Ratchet-wheel and Pinion.

F, The Ratchet-wheel, with its barrel a, pinion, b, &c. See the deſcription of F, in Fig. 1, &c.

G, A Lever, with its hooks, whoſe uſe is enumerated in the deſcription of G, Fig. 1.

H, A Saw-frame, marked 1, wherein are two ſaws, with their ſtretchers and wedges. See deſcription of H, Fig. 1.

PLATE

PLATE II. FIG. 7.

A perſpective View of one of the Saws, with its Stretchers and Wedges.

PLATE III. FIG. 3.

A perſpective View of the Floor, Carriages, Rollers, Ratchet-wheels, &c.

F, F, F, The three Ratchet-wheels, and pinions b, b, b. See Fig. 1. and 3.

I, I, I, Three Carriage-frames, &c. on which the ſtocks are laid to be ſawed.

V, V, V, &c. Short Poſts, mortiſed into each of the outer rails of the two outſide carriage-frames. An iron crow paſſes occaſionally through the holes in the poſts, to ſteady and fix the ſtocks to the carriage-frames, as ſet forth in the deſcription of V, Fig. 1.

W, W, W, Three Iron Racks, inſerted into the end rails of the carriage-frames, and faſtened thereto with iron keys and bolts, paſſing through apertures in the middle of the Racks.

X, X, &c. A ſet of Friction-rollers, over which the middle carriage-frame is drawn.

Y, Y, &c. A ſet of Wooden Studs, or Tenons, faſtened to the floor, and projecting a quarter of an inch above its ſurface: their

their uſe is to guide the middle carriage-frame, in the under part of which are two grooves, or channels, which paſſing looſely over the before-mentioned Studs, are thereby conveyed, in a ſtraight direction, from end to end.

PLATE IV. FIG. 5.

A Geometrical Plan of the Water-wheel, Carriage-frames, Ratchet-wheels, &c.

A, A Water-wheel.

F, F, F, The Ratchet-wheels, deſcribed and repreſented in Fig. 1. 3. and 6.

I, I, I, Three carriage-frames, on which the ſtocks are laid, and faſtened with iron crows and wedges, as before-mentioned in the deſcription of Fig. 1, &c.

K, K, Two Winches, with which the carrriages are drawn back.

V, V, &c. The ſhort Poſts, with nine holes in each, as ſet forth in the deſcription of Fig. 1. and 5.

W, W, &c. The Iron Racks. See the deſcription of Fig. 7. &c.

X, X, &c. Friction-rollers. See the deſcription of Fig. 5. and 6.

Y, Y, &c. The Studs. See Fig. 3.

a, a, a, Three Barrels, or grooved wheels, on which the lines, or ropes, are gradually wound up, as the carriage moves forward; and

and by which they are alſo drawn back with the winch K, when the ſtocks are ſawn quite through.

b, b, b, Three Pinions, connected with the racks and carriage-frames, which are gradually driven forward thereby over the directing ſtuds Y, Y, &c. as already mentioned in the deſcription of Fig. 2.

PLATE IV. FIG 4.

A Geometrical Plan of one of the Iron Racks. See W, W, &c. in the Deſcription of Fig. 5 and 6.

PLATE V. FIG. 8.

A perſpective View of one of the Saw-frames, Ratchet-wheel, Crane, &c.

H, A Saw-frame, 3.

L, A Lever, actuated by the ſaw-frame 3. See deſcription of L, Fig. 1.

M, A Ratchet-wheel and Barrel, actuated by the lever and its hook at every elevation of the ſaw-frame 3.

N, A Crane, with its Pullies, &c. ſet forth in the deſcription of N, Fig. 1, &c.

O, A Wooden Hook. Its uſe is indicated in the deſcription of Fig. 1.

Thee

Theſe drawings are taken from a model of a ſaw-mill made by Mr. James Stansfield, to a ſcale of one-fourth of an inch to a foot; for which the Society gave him one hundred pounds, and ten guineas for his improvement of a croſs cutting-ſaw added thereto, December 12, 1765.

The original mill, of which this is a model, was erected, and worked for five ſucceſſive years, in conſequence of ſucceſſive premiums offered, and paid by the Society; amounting in the whole to the ſum of two hundred and twenty pounds.

N. B. Theſe drawings are made to a ſcale of two inches to a foot of the model.

CHAP.

CHAP. II.

A Deſcription and Explanation of Mr. BURROW'S MACHINE *for Grinding and Poliſhing Glaſs, taken from a Model made to a Scale of one Inch to a Foot.*

PLATE I. FIG. 1.

A perſpective View of the MACHINE.

A, THE Shaft of the Cog-wheel, is nine inches long, and three-fourths of an inch in diameter; the under end of this Shaft turns on a ſteel point or pivot, and its upper end is an iron gudgeon, as repreſented in Fig. 1.

B, An horizontal Cog-wheel, one foot in diameter, with one hundred and ſixty-eight teeth. This Wheel gives motion to the ſmall horizontal wheel E, and the vertical wheel V.

C, An horizontal Collar Beam faſtened to the perpendicular ſhaft; this machine is worked with a horſe faſtened to the horizontal Collar Beam, whoſe radius is five inches and an half.

D, Two Collar Staves mortiſed into the collar beam.

E, An horizontal Spur-wheel, one inch and three-fourths diameter, with thirty-two teeth.

F, An Iron Crank, whoſe radius is half an inch, the upper end of this Crank is the ſpindle of the ſmall cog-wheel E; its extreme length is five inches ſeven-eighths; thickneſs one-eighth and

one-ſixteenth of an inch; this Crank gives a progreſſive and regreſſive motion to the iron rod K, which traverſes through a jaw in the head of the pillar L.

G, A Braſs curved Arm, two inches and eight-twelfths long, with a hole for a center pin at its inner end, and a cock on its upper ſurface, through which the directing rod K, traverſes; and by the oblique motion of the crank F, the point of the curved Arm G, ſtrikes promiſcuouſly againſt the teeth of the ſtar-wheel H, by which means an irregular motion is given to the box N.

H, A Braſs Wheel, one inch and five-twelfths in diameter, with eleven long teeth: this Wheel is faſtened to an iron center pin, fixed in the middle of the wherrer-box N. The upper end of the center pin projects above the ſurface of the wheel, and paſſes looſely through a hole in the directing rod K, for which purpoſe the rod is made flat at that part where the pin paſſes through.

I, A Jaw, or Notch, in the Pillar, to ſuſtain and guide the directing rod.

K, The Directing Rod, eight inches and an half long, and eight-twelfths of an inch thick. At the inner end of this Rod there is a hole to receive the crank F; and four inches diſtant from it, there is another hole to receive the ſpindle, or center pin, of the wheel H.

L, A Braſs Pillar, whoſe extreme length is three inches and three eighths; thickneſs five-eighths of an inch at its baſe.

M, A Plate of Glaſs, properly fitted on its bed to be ground.

N, A Braſs Wherrer Box, three inches and an half long, and three inches broad: on the apex of its upper ſurface, is fixed

an

an iron center-pin which paſſes through the ſtar wheel H, and the middle of the directing rod K.

O, A Block of Wood, on which the glaſs is truly and properly laid to be ground.

P, A Sand Box, or Bed, four inches and an half by four inches three-fourths, and half an inch deep.

Q, A Pedeſtal of Wood, whoſe baſe is three inches diameter, and height two inches.

R, R, R, R, Four Braſs Pillars, each of whoſe extreme length is eight inches three-eighths, and their diameter at the baſe eleven-twelfths of an inch; theſe pillars ſuſtain the croſs braces U, U.

S, A flat piece of Braſs, eight inches and an half long, five-eighths of an inch broad, and one-fourth of an inch thick, which ſupports the vertical wheel V, with its axis or crank.

T, A Braſs Pillar, four inches three-eighths long, and five-eighths of an inch in diameter at its baſe. On this pillar is fixed a convex bed W, with a cap properly prepared, either for grinding or poliſhing concave and convex glaſſes.

U, U, Two Croſs Braces, one of them is two feet long, the other one foot three inches and an half long, five-eighths of an inch broad, and two-twelfths of an inch thick; the ſpindle of the main ſhaft A, turns in the center of this brace, and its four arms are faſtened to the pillars R, R, R, R.

V, A Vertical Spur Wheel, three inches five-eighths diameter, with fifty-two teeth; the axis of this Wheel is a compounded crank, which actuates twelve poliſhing rods.

W,

W, A Convex Rod, one inch and a quarter diameter, covered with a concave, or ſpherical cap. See Fig. 2. On the top of the cap is fixed an iron center pin, which paſſes through the iron rod Y, as repreſented in Fig. 1.

X, A Crank, whoſe radius is three-fourths of an inch; this Crank gives motion to twelve rods, poliſhers, &c. as before-mentioned. The Crank turns in one of the pillars R, and the other in a flat piece of braſs S, faſtened to the floor and to one of the arms of the croſs brace U.

Y, An Iron Rod, ſeven inches and an half long, and two-twelfths of an inch thick, with a hole in the middle of it to receive the iron pin in the ſpherical cap W; one end of this Rod is connected to the crank which gives motion to the ſpherical cap, the other end paſſes through a jaw or notch in a braſs pillar (not in this view) in the ſame manner as the Rod I, in the pillar K.

Z, Z, Two Iron Rods, each four inches and a quarter long, and two-twelfths of an inch thick; the fore ends of theſe Rods are faſtened to the poliſhers with ſcrews and nuts; and their other ends to the crank X, whoſe reciprocal motion (as before-mentioned) works twelve rods and poliſhers, more or leſs, according to the ſize of the plate of glaſs.

N. B. Two only of the ſaid rods are repreſented in this view of the machine.

a, a, a, a, Four Braſs Pillars, each of whoſe extreme length is four inches and three quarters, and eight-twelfths of an inch diameter

diameter at the baſe. Theſe pillars ſupport the bed, or table, C, on which the glaſs is placed to be poliſhed.

b, b, The notched Sides of the Bed, or Table, are three quarters of an inch broad, and one twenty-fourth of an inch thick. There are twelve notches, cut down parallel to each other in the Sides of the Bed, for the direction of the rods Z, Z, &c.

c, The Bed, on which the glaſs is laid to be poliſhed: its dimenſions are, five inches and one-eighth long, four inches broad, and half an inch thick.

d, d, The Poliſhers, clothed, and faſtened with ſcrews to the crank rods.

e, A Plate of Glaſs.

PLATE II. FIG. 2.

A Plan of the MACHINE.

A, The main Shaft, whoſe dimenſions are ſet forth in the deſcription of Fig. 1.

B, The horizontal Spur-wheel.

C, The Collar Beam.

D, The Collar Staves.

E, The horizontal ſmall Spur-wheel.

G, The Braſs curved Arm.

H, The Star, or Ratchet-wheel.

I, The Notch, in the head of the pillar.

K, The Directing Rod.

M,

M, A Plate of Glaſs, fitted to its bed, &c.

N, The Braſs Wherrer-box.

O, The Block, on which the plate is cemented.

P, The Star-box, or Table.

R, R, R, R, The four Pillars.

S, A flat Piece of Braſs, which ſupports the vertical wheel and crank.

U, U, &c. The Croſs Braces, faſtened to the pillars.

V, The vertical Spur-wheel.

W, The Convex Bed, &c.

X, The Cranks.

Y, The Directing Rods.

Z, Z, &c. The Directing Rods of the poliſhers, &c.

a, a, a, a, The four ſmall Pillars which ſupport the poliſhing frame.

b, b, The Sides of the Poliſhing Frame, with notches cut down for the rods to run in.

c, The Block, or Bed.

d, d, The Poliſhers.

e, The Plate of Glaſs.

f, A ſmall Pillar, five inches and three quarters long, not ſeen in the perſpective view, Fig. 1. On the top of this Pillar there is a notch, or aperture, through which the rod of the ſpherical cap paſſes in its retrograde motion.

The original Machine was invented by Mr. Burrows, who kept it at work three months, for which he obtained a premium of ſeventy pounds, May 20, 1765. The Model of this Machine was purchaſed of Mr. Burrows, for the ſum of twenty guineas, May 10, 1767.

CHAP. III.

A Deſcription of Mr. PINCHBECK'S CRANE.

PLATE I. FIG. 1.

A perſpective View of the Model of the CRANE, *made to a Scale of a quarter of an Inch to a Foot.*

A, THE Floor, on which the crane is erected.

B, B, &c. The Poſts of the Frame, are one foot eleven inches long, from ſhoulder to ſhoulder, and one inch ſquare.

C, C, C, C, Four ſide Rails, one foot eleven inches long. The two upper rails are one inch ſquare, and the two under rails one inch and a quarter broad, and one inch thick.

D, D, Two Tranſoms, ſeven inches long, and one inch ſquare.

E, The great Walking Wheel, in which the men walk, is one foot ſeven inches in diameter, and four inches and an half broad on its periphery.

F, F, The Axis of the Walking Wheel, is ſix inches and an half long, from ſhoulder to ſhoulder; four inches and five-eighths of its length, are two inches and one-eighth ſquare: and the cylinder, or round part, (on which the rope is wound up) is two inches in diameter.

G,

G, A Spur-wheel, three inches and one-eighth in diameter, with ninety-ſix teeth. This wheel gives motion to the pinion and crank H, I.

H, An Iron Pinion, with eight teeth; the ſpindle of this Pinion turns in a braſs frame, faſtened to the front under rail of the frame: at the end of the ſpindle there is a crank, whoſe radius is half an inch: this crank is connected to the feeding bellows L, by the iron rod K.

I, A Crank, fixed on a ſquare in the fore end of the ſpindle of the pinion H.

K, An Iron Rod, fourteen inches and an half long; its upper end is hung to the crank I, its under end paſſes through an aperture in the floor, and is faſtened with an iron pin to the under-board of the feeding bellows L.

L, The End of the Feeding Bellows, to which the rod K is faſtened as before-mentioned.

M, A Dial Plate, or Regulator, one inch and five-eighths diameter, fixed to a pedeſtal on the floor. A ſegment of this plate is divided into three equal parts, marked 1, 2, 3, with a directing hand, by which the motion of the walking wheel is regulated in the following manner; viz. when the directing hand points to No. 1, the aperture g (for diſcharging the wind out of the bellows) is dilated to its greateſt extent, to give vent to the wind. When it is ſet to No. 3, the aperture is contracted to its ſmalleſt dimenſions, by which means the upper bellows retains the blaſt of wind, which the feeding or under bellows throws into it; and, by this means, its upper board is elevated ſo high as to raiſe the lifter Q, and the other movements connected thereto.

N, A perpendicular Iron Spindle, five inches long, and a quarter of an inch diameter. This Spindle paſſes through the center of the dial plate M, having a directing hand fixed to its upper end, and to its under end an horizontal crank, whoſe radius is one quarter of an inch.

O, A Braſs Arm, or Leader, which ſerves to open and ſhut the ſliding valve P, its length is one inch and three-eighths; its extreme breadth is a quarter of an inch, and its thickneſs a twenty-fourth part of an inch: at the fore end of this Leader, is rivetted an iron pin, which paſſes through the crank, and at the other end there is a ſmall hole to receive the iron pin rivetted to the ſliding valve P.

P, A Sliding Valve, which runs in a rabbet in the upper-board of the receiving bellows; its dimenſions are one inch and an half in length, ſeven-twelfths of an inch in breadth, and one-twelfth of an inch in thickneſs. This Valve is regulated by the directing hand of the regulator M, at the bottom of whoſe ſpindle are fixed the crank and leader, as before-mentioned. See Fig. 3.

Q, A Lifting Trundle, one inch and five-eighths long, and a quarter of an inch in diameter. This Trundle is capped with a thin round piece of wood, one inch and an half diameter, and one eighth of an inch thick. This Trundle paſſes through the floor, extending ſo far below it, as to embrace and be lifted up by the upper-board of the receiving bellows, when the walking-wheel accidentally revolves with too great a degree of velocity.

N. B. The Trundle, latch, ſliding bolt, and all the other movements connected thereto, are at all times in a ſtate of reſt, till

the

the walking-wheel (as before-mentioned) is by ſome accident violently agitated; and, when it ſo happens, the expanſion of the bellows will be immediately ſo far extended, as to lift up the Trundle, latch, &c.

R, An Iron Latch, whoſe length from its center of motion b, to the extremity of its right angled arm c, is two inches; and from c, to d, one inch, and one-twelfth. Its height from b, to e, is one inch and three-twenty-fourth parts of an inch, and from b, to its ſhoulder f, is ſeven twelfths of an inch. Its breadth is two-twelfths of an inch, and thickneſs one-twelfth. The arm of the Latch c, d, is actuated by the trundle Q, as repreſented in Fig. 1, 2, 4.

S, A Curved Spring, four inches and an half long, and one inch broad at the end, which is faſtened to the floor, and one third of an inch broad at its point, or noſe, which lies under the ſliding-bolt. At this end of the Spring, there is a ſquare hole for the apex and ſhoulder e, f, of the latch, to paſs and repaſs freely through, when the noſe of the Spring is preſſed down by the curved piece of braſs l, on the under-ſide of the ſliding bolt. See Fig. 4.

T, A Flat Sliding Bolt, eleven inches long, one-third of an inch broad, and one-twelfth of an inch thick. At each end of the Bolt, there is faſtened a nut, or ſquare piece of braſs, which ſerves to ſtop its motion, when either the walking-wheel, or the weight and brake W, Z, have drawn it againſt the ſtaples V, V, the diſtance required for the curved piece of braſs l, to preſs down the noſe of the ſpring S, by which means the ſhoulder f, of the latch,

latch, is either fixed, or disengaged therefrom, as before-mentioned. See Fig. 1, 2, 4. The weights W, and the brake Z, are connected to the Sliding Bolt by lines i, k. See Fig. 1, 2.

U, Two Pullies, three-fourths of an inch diameter. The pullies run in a brass frame fastened to the floor; their use is to convey the line i, at right angles, from the sliding bolt T, to the upper Pulley Y, and the line k, to the brake, or hug Z. See U, i, k, Fig. 1. 2.

V, V, Two Staples, fastened with wood-screws to the floor. These Staples serve to direct and stop the sliding bolt, when the walking-wheel, or the weights have drawn it to the distance required. The Staple, which is fixed near to the center of the walking-wheel, is made of a height sufficient for the bolt to rise and catch the studs a, a, &c. of the walking-wheel; but the other Staple has only an aperture fit for the bolt to pass through freely.

W, Three Lead or Iron Weights, (which, for a large crane, are about half an hundred each) with holes in their centers for the line i to pass through, and cavities in their under surfaces to receive the separate knots in the said line, which are about three inches distant from each other, and on which the three Weights are suspended, and gradually lifted up, one after the other, by the progressive motion of the sliding bolt T; by which ingenious contrivance, the walking wheel is stopped, in its greatest velocity, by such gentle degrees as not to be shocked, or scarcely felt by the men in the wheel.

X, A Spiral Spring, which is of such strength as to be extended about four inches before the first weight begins to be lifted

up.

up. The two other weights are lifted up, one after the other, by their reſpective knots, in the ſame manner as the firſt. The ingenious inventor judiciouſly applied this Spring, and the knots in the line i, to prevent it from breaking by the ſudden tenſion, or jerk, which it otherwiſe would receive from the motion of the ſliding bolt. The line i paſſes through the circumvolutions of the ſpring, and is faſtened to each end of it; but it is ſo looſe within its circumvolutions, as to ſuffer the Spring to be extended, as before-mentioned, four inches before the firſt weight begins to riſe.

Y, A Pulley, one inch and an half in diameter, faſtened to the under ſide of the fore tranſom D.

Z, A Brake, or Hug, one end of which is faſtened to the hind tranſom of the frame, and the other to the link of the ſliding bolt, which occaſionally draws down the Brake on the periphery of the walking wheel; which cauſes ſo much friction thereto as gradually to impede its motion, till one of the ſtuds a, meets the inner ſtaple of the ſliding bolt. See V, V, Fig. 1. 2.

a, a, &c. Twelve Braſs Studs, which are faſtened with ſcrews to the periphery of the walking wheel, and ſerve to put a total ſtop to it, when, by accident, its motion is accelerated.

e, The Point of the Latch. See Fig. 4.

f, The Shoulder of the Latch. See Fig. 1. and 4.

g, The Aperture, through which the wind is diſcharged out of the receiving bellows, by a proper contraction of it with the valve P. See Fig. 3.

h, A Braſs Cock, faſtened to the floor to receive the pin, or fulcrum b, of the latch R. See Fig. 4.

i,

i, A Line, fastened to the sliding bolt T, to which the weights W are suspended.

k, A Line, fastened to the brake Z, and sliding bolt T.

l, A curved Piece of Brass, fastened to the sliding bolt T.

FIG. 2.

Q, The Cap of the Trundle,

R, The Iron Latch. See Fig. 1.

S, The curved Spring. See Fig. 1.

T, The Sliding Bolt.

U, The Pullies.

V, V, The Staples.

c, d, The Arm of the Latch.

e, The Point of the Latch. See Fig. 4.

h, The Brass Cock, or Fulcrum of the Latch.

i, The Line of the Weights.

k, The Line of the Brake.

l, The curved Piece of Brass, which presses down the nose of the spring S.

FIG. 3.

M, The Dial Plate, or Regulator, with its directing Hand.

N, The Spindle of the Regulator.

O, The Arm of the Leader, which opens and shuts the sliding valve.

P,

P, The Sliding Valve.
g, The Aperture, through which the wind is discharged.

FIG. 4.

R, The Latch, with its cock or fulcrum.
b, The Iron Pin, on which the latch turns.
c, d, The Arm of the Latch.
e, The Point of the Latch.
f, The Shoulder of the Latch.
h, The Cock, or Fulcrum of the Latch.

FIG. 5.

Q, The Cap of the Trundle in Fig. 1.

This new invented Crane was referred to the Committee of Mechanics, who was of opinion that this method of preventing fatal accidents (which frequently happen in common walking Cranes) is entirely new, ingenious, and very effectual for the purposes for which it is intended. A trial of the Crane was made several times, at Dice's Key, with an hogshead of pot-ash, sixteen thousand pounds weight; and it appeared to the Committee that the invention will fully answer under all circumstances, and may be constructed at an easy expence: it was therefore recommended to the Society, to give Mr. Pinchbeck the gold medal of the Society, for his ingenious and useful invention. To which the Society agreed, June 3, 1767.

CHAP. IV.

A Deſcription and Explanation of the Model of Mr. WIRTZ'S HYDRAULIC MACHINE, *preſented to the Society by* RODOLPH VALTRAVERS, Eſq.

PLATE I. FIG. 1.

A perſpective View of the MACHINE.

A, A Pedeſtal, or Block of Wood, eight inches diameter, and one inch and three quarters thick.

B, A Braſs Crotchet, ſcrewed to the pedeſtal and properly fitted to the ſolid, and alſo to the hollow end of the axis of the machine. The jaws, or notches, in the upper part of the Crotchet, are intended only for the conveniency of taking the machine off, occaſionally, from the pedeſtal, and putting it on with as little trouble as poſſible.

C, A Braſs Cock, one end of which is rivetted to the crotchet, the other is turned up at right angles with the horizon, and is properly indented to embrace the neck, or perpendicular part of the braſs tube D, connected to the hollow part of the axis.

D, A curved Braſs Tube, whoſe perpendicular end is a male ſcrew, fitted to the end of the glaſs tube E, and its under end to the braſs ſocket F.

E,

E, A Glaſs Tube, with braſs ſcrews cemented to each end of it, for the conveniency of adding thereto a ſufficient number of tubes, to raiſe the water ſix feet above the axis of the machine.

F, A Braſs Socket, ſcrewed to the under end of the curved tube; within this ſocket there is another ſmall one on which the outſide ſocket turns, as repreſented in this ſection of the machine.

G, The hollow End of the Axis.

H, A thick round Braſs Plate, which, in this view, appears like two pieces of braſs rivetted together; this plate is ſoldered to the hollow part of the axis, and fitted, water tight, to the ſide of the wheel; for which purpoſe there is a piece of leather put in between the ſaid plate and the wheel, which are preſſed together with the braſs nut N, fitted to the ſcrew on the ſolid part of the axis.

I, The upper Rim of the Braſs Plate, lined with leather, as before-mentioned.

K, A Braſs Wheel, ſix inches and a quarter diameter, and ſeven-eighths of an inch broad on its periphery, which is perforated with ſmall holes for the water to paſs through into the ſpiral conveyance.

M, The ſolid End of the Axis, to which is faſtened a winch, with which the wheel is turned round to ſhew the experiment.

PLATE

PLATE I. FIG. 2.

A View of the MACHINE, *with its Side laid open to ſhew the Circumvolutions of the Spiral Conveyance, and the Holes through which the Water paſſes into the hollow Part of the Axis.*

A, The Pedeſtal.
B, The Crotchet.
E, The Glaſs Tubes.
K, The Wheel.
M, The ſolid End of the axis.
N, The Nut, with which the plates and wheel are preſſed together.

This Machine was examined by the Committee of Mechanics, who was of opinion that Mr. Zeigler was deſerving of the gold medal of the Society for his ingenious Spiral Water-wheel. The Committee recommended to the Society alſo, to preſent Mr. Valtravers with the Society's ſilver medal, for the trouble and expence he had been at on account of the ſaid Machine; to which the Society agreed, January 6, 1768.

CHAP. V.

A Deſcription and Explanation of the Model of Mr. WIRTZS's *improved* HYDRAULIC MACHINE, *preſented to the Society by* RODOLPH VALTRAVERS, Eſq;

PLATE II. DIVISION 1. FIG. 3.

A perſpective View of the improved WHEEL, *which is one Foot ſeven Inches Diameter, two Inches broad, and one Inch and an half thick.*

A, A Winch, with which the wheel is turned to ſhew the utility of the machine.

B, A Curved Braſs Tube, ſoldered to the hollow end of the axis of the wheel; and to the innermoſt end of the ſpiral tube G.

C, A Scoop, or Bucket, faſtened to the periphery of the wheel. This Scoop being filled with water at every revolution of the wheel, diſcharges its contents (as it aſcends) into the outermoſt end of the ſpiral tube, and from thence through its different circumvolutions into the hollow part of the axis D, &c.

E, A Curved Tube, twelve inches and an half long, and three eighths of an inch diameter, with a ſhort neck, turned up at right angles with the horizon: at the extremity of this Tube there

is

is faſtened (in a perpendicular direction) a braſs pipe, or ſet of tubes, elevated thirty feet above the axis of the wheel: the water is forced up through this pipe by the action and ſuperior weight of the water contained in the circumvolutions of the ſpiral Tube G.

F, Part of the perpendicular Pipe, faſtened to the neck of the curved tube B.

G, A Spiral Tube conſiſting of four circumvolutions, laid three a-breaſt on the periphery of the wheel: the whole length of this Tube, when laid out in a ſtraight line, is ſomewhat more than the length of the perpendicular pipe, or tube.

This model was worked in preſence of the Committtee of Mechanics, who reſolved to recommend to the Society to preſent Mr. Valtravers with the gold medal of the Society for procuring the ſaid hydraulic model, and other repeated ſervices; to which the Society agreed, January 6, 1770.

PLATE II. DIVISION 2.

This diviſion of plate the ſecond contains a perſpective view of Mr. Wirtzs's Hydraulic Machine, &c. taken from a drawing which Dr. Zeigler made of it, in its original ſtate at Zurich, in Switzerland: the whole conſiſting of a perſpective view of the Machine; a plan of the ſpiral tube, or conveyance; a ſection of the axis and perpendicular tube; a view of the ſtage on which the Machine is erected, and of the Dye-houſe ſupplied with water by this ingenious contrivance; the utility and deſcription of which Dr. Zeigler has minutely ſet forth, in his Diſſertation on the Zurich Acts, Vol. III.

CHAP.

CHAP. VI.

A Deſcription and Explanation of Mr. MERRYMAN'S HYDRAULIC MACHINE.

FIG. 1.

A perſpective View of the MACHINE, *taken from a Model made to a Scale of three Inches to a Foot.*

A, A Small wooden Edifice, with an under and upper floor erected over the well pit, or pond, from whence the water is to be raiſed.

B, The under Floor, is one foot ſix inches ſquare.

C, C, &c. Four Poſts erected on the frame of the under floor. Their extreme length is fifteen inches and an half, and one inch ſquare each.

D The upper Floor, is of the ſame dimenſion as the under floor.

E, E, E, E, Four Rails, twelve inches and three-fourths long, one inch broad, and half an inch thick.

F, F, F, &c. Eight Diagonal Braces, ſix inches and one-fourth long, half an inch broad, and three-eighths of an inch thick.

G, A Water Trough, fourteen inches long, four broad, and two inches deep.

H,

H, A Shute to convey the water from the trough to the place intended.

I, K, L, M, Four Pair of taper Trunks of different ſizes, each pair are made to fit one into the other. The outſide Trunks are all ſix inches long, but of different widths. The upper end of the Trunk I, is two inches and a quarter ſquare; its under end is one inch and a quarter (inſide meaſure.) The Trunk K, is two inches ſquare at the top, and one inch at the bottom. L is one inch and three quarters ſquare at the top, and three quarters of an inch at the bottom. M is one inch and an half at the top, and half an inch at the bottom. Theſe Trunks being water tight, are fixed to the trough paſſing through its bottom, and alſo through the under floor into the water; the upper edges of the Trunks are fixed even with the edges of the trough; at the bottom of each of the outer troughs there is a thin braſs valve (See Fig. 2.) which admits the water to riſe when the inner Trunks N, N, &c. are lifted up by the croſs beam O.

N, N, N, N, Four Forcers, or ſmall Trunks, of the ſame ſhape as the outer trunks; but their dimenſions are ſuch, as to fill up the cavity of their reſpective outer trunks. Theſe inner Trunks, or Forcers, are alſo made water-tight, but have no valves at their bottoms. A quantity of ſand, gravel, or any other ponderous matter, is put into theſe Forcers, ſufficient to ſink them to the bottom of the outer trunks, when full of water; by which means the water is forced over the brims of the outer trunks into the trough G, and from thence conveyed off by the ſheets H, to the place intended.

O,

O, The Lifting Beam, connected to the four forcers and the bottom of the maſt Q, by chains, as repreſented in Fig. 1.

P, P, The Gauges or Guide-frames, are each fourteen inches and ſeven-eighths long, one inch and an half broad, and three-eighths of an inch thick; mortiſed into the under and upper rails of the machine. In each of theſe Guide-frames, there is an aperture for the lifting beam O, to move freely up and down, in a perpendicular direction; and in the edges of the ſaid guide-frames, there are holes, with iron pins, to regulate the diſtance of the lifting beam. The under pins ſerve to prevent the ſand trunks, or forcers, from deſcending ſo low as to bear on the valves of the water trunks; and the upper pins are to prevent the maſt Q, from yielding ſo much to the force of the wind, as to be thrown off from its baſis.

Q, The Maſt, two feet long, two inches in diameter at the bottom, and five-eighths of an inch thick at the top; its upper part is round and taper, and the under part in the form of an hexagon: on each face, or ſide, is a quadrant, or ſegment of a circle, R, mortiſed into the foot of the Maſt, and braced with ſix concentric braces T, T, &c. which are alſo mortiſed into the Maſt, as repreſented in Fig. 1. Its curved baſis being thus formed, its bearing point, or center of gravity, will vary in every degree of inclination of the Maſt, by the preſſure of the wind againſt the ſail, &c.

R, R, &c. Six Quadrants, whoſe radiuſes are each ſeven inches; one end of each Quadrant is mortiſed into the foot of the

maſt,

maſt, and the other end is elevated four inches and an half from the ſurface of the upper floor.

S, S, Two Iron Rings, faſtened to the ends of the pole V, which turn looſely round the maſt.

T, T, &c. Six concentric Braces, mortiſed into the maſt and to the elevated ends of the quadrants. Theſe quadrants and Braces ſupport the maſt, with its ſail, &c. and ſuffer it to incline to the horizon, more or leſs, according to the force of the wind.

V, A Pole, or Staff, one foot long, and half an inch in diameter. This Pole is connected to the maſt with two iron rings, which turn looſely round the maſt, but are fixed to each end of the pole.

U, A Sail, made of coarſe cloth, twelve inches ſquare, and faſtened with ſmall cord to the ſail-arms.

W, W, The Sail-arms, one foot long, a quarter of an inch thick in the middle, and one-eighth of an inch at each end.

X, X, Two horizontal Trundles, two inches and an half long, and a quarter of an inch ſquare; theſe Trundles are inſerted into the pole V, diverging from each other one inch and an half at their extremities, where they are inſerted into the upper ſail-arm.

Y, Y, Two curved Braces, two inches and an half long, and one-eighth and one-ſixteenth of an inch diameter; theſe Braces are inſerted into the pole V, and the trundles X, X. By this ingenious contrivance, the ſail, with its pole, turns with the wind to any point of the compaſs; and, by the action of the wind, and reaction of the ſand trunks, the maſt obtains a regular rolling motion; and

the

the number of trunks raiſed will be proportionable to the force of the wind; that is to ſay, if it blows a gentle gale of wind, one or two ſand trunks will be agitated; if a ſtiff gale, the maſt will incline more to the horizon; and by that means give motion to a greater number of ſand trunks, whoſe weight will counter-act the force of the wind, as before-mentioned.

FIG. 2.

a, A Section of the Water and Sand Trunks; their dimenſions, uſe, &c. explained in Fig. 1. See the letters I, K, L, &c.

b, The Sand Trunk, or forcer, with its fixed bottom.

c, An Iron Handle, faſtened to the ſides of the forcer, or ſand trunk.

d, The Braſs Valve, faſtened to the bottom of the water trunk.

As this invention is quite new, ſimple, ingenious, and capable of improvement, the Society preſented Mr. Merryman with a ſilver medal, February 26, 1766.

CHAP.

CHAP. VII.

An Explanation of the Apparatus used by the DUTCH, *in the Turbot and Cod Fishery.*

A, A, &c. TAnned Lines, made of the best materials, and as pliant as possible, so as not to be subject to kink; they are from forty to fifty fathoms long each: sixteen of the Lines are under the care of each man of the crew, which generally consists of ten hands to each vessel.

B, B, &c. Hooks, with snoods fitted to them, about two feet in length, to be fitted to the lines, at the distance of about two feet from each other.

C, C, &c. Anchors with Wooden Stocks, weighing about eight pounds each: there is one of these to the end of every three lines; the lines are to be made fast to the shanks of the Anchor.

D, A Buoy Rope for each anchor, about fifty fathoms in length. One end of this Rope is to be fastened to the ring of the anchor, and the other end to the buoy.

E, A light neat Buoy, with a Staff that goes through it. This Staff is about twelve feet long; two thirds of which are above the head of the Buoy. On the top of each Staff is a piece of leather, or some kind of flag; the mark of each to be different

in colour, or otherwiſe, ſo as to diſtinguiſh the firſt Buoy from the ſecond, the third from the fourth, &c.

F, An Iron Strap, fixed to the bottom of the buoy-ſtaff; having an iron ſwivel thereto, weighing about ſeven or eight pounds, which ſerves not only to take the kinks out of the buoy-rope, but alſo as a balance to keep the buoy-ſtaff upright, and as a beacon to ſail by from buoy to buoy, or to ſave the lines in caſe of their breaking.

G, A Tray, made of inch or three quarters of an inch deal, with iron clamps to keep it together. It ſhould be about four feet ſeven inches long, and one feet nine inches wide, with bevelling ſides about five inches high, and the like at one of the ends; having ſome holes at the bottom to put ſticks in, to receive the hooks for the more ready baiting them. This Tray is uſed to coil the lines in, when the hooks are baited, which by this means are ready for running when the lines are to be caſt.

H, H, Hook-ſticks, pointed at the ends to ſtick into the holes in the bottom of the tray, and clift at the other end to receive the hooks, which are to be taken off from thence to be baited. This prevents the line from tangling.

I, A large round Wicker baſket, for coiling the lines in, when they are haling in the fiſh.

K, A Small Grapling, with a double row of hook arms, with which each veſſel is to be furniſhed, to creep for their lines in caſe of their breaking.

The Method of laying the Lines is as follows:

The veſſel ſtretches on under an eaſy ſail with the tide, but ſtanding about four or five points athwart it. An able and dextrous hand attends at the ſtern, and receives the buoy rope and anchor with the lines fixed to them: which latter he veers away from the tray brought by the firſt man; whoſe lines being near out, a ſecond advances with another tray and the like apparatus, and brings the outer end of the line, to the inner end of the former: and they are veered out as the former, and ſo on till the whole are expended, and the laſt anchor let go.

When the veſſel parts with the lines, which is generally about ſlack water, or on the turn of the tide, about eight thouſand fathoms of line are laid and moored on the ground furniſhed with ſixteen thouſand hooks and ſnoods faſtened thereto. The veſſel then makes ſail, and works up to the firſt buoy, endeavouring to be there ready, when the tide ſlacks again, to take up the line, dropping down upon it with an eaſy ſail: and, as they haul in their fiſh, they throw them into the well, frequently without ſtaying to diſengage the hook by cutting the ſnoods. Each man tends his own lines, which he coils into the baſket as they are hauled in; and prepares them after at his leiſure, by freſh baiting, and coiling them in the tray ready for the next occaſion. In caſe of the wind ſhifting, they ſometimes wait at the laſt buoy, taking the lines in at either end that may beſt ſuit.

In

In this manner, the Dutch likewiſe fiſh with long ground lines for cod-fiſh on the Dogger Bank, and other places; by which they have great advantage over us, who uſe only eight ſingle hand lines in each veſſel.

The bait, which the Dutch uſe for catching cod in the above-manner of fiſhing, is the lamprey eels, which are tough, and will lay on the ground without rubbing off the hooks. They get theſe eels from the river Thames, at Brentford, where they are in great plenty, and ſent annually (in the months of November, December, January, and February,) over to Holland, from ſixty to ninety thouſand alive in each veſſel, while not one of them is uſed by our fiſhermen for catching cod fiſh.

N. B. It has been generally miſunderſtood, that the lamprey eel is alſo uſed by the Dutch as a bait for their turbot fiſhery: but the bait for the turbot fiſhery is the garr fiſh, called by ſome people the long-noſes. The heads and tails are cut off, and then the bodies are ſplit and ſalted.

The Dutch likewiſe uſe ſalted ſmelts; both theſe kinds of fiſh having a ſhining ſkin, they allure the turbot. Mackarel and herrings are likewiſe uſed ſometimes for this purpoſe.

N. B. Mr. Thomas Briant, rope-maker in Harwich, makes turbot-lines, ſnoods, and buoy-ropes, equal in goodneſs to the Dutch; price of the lines two ſhillings each; ſnoods ten ſhillings; buoy-ropes four ſhillings and ſix-pence each. Turbot-hooks ſold by Mr. Knight, of Crooked Lane, London, equal in goodneſs to

the

the Dutch. Can-buoys and ſtaff made by Meſſrs. Dell and Co. at Horſley Down, Southwark.

The garr-fiſh bait is in great plenty on the coaſts of Kent and Suſſex, and cured or ſalted by Mr. Chalk, ſen. of Folkſtone. It may be procured all along the coaſts of the Britiſh Channel, in the months of April, May, June, &c. the anchors, &c. may be made by Engliſh workmen.

CHAP. VIII.

A Deſcription and Explanation of Mr. WILLIAM BAILEY'S MACHINE *for Boring Auger Holes; which may be of great Uſe to Ship and Houſe Builders, common Carpenters, Mill-wrights, Wheel-wrights, and Pump-makers; and alſo for boring into the Ground for the Diſcovery of Minerals, &c.*

PLATE I. FIG. 1.

A perſpective View of the MACHINE.

A, A Wooden Frame, twelve inches long, nine inches and an half broad, and one inch and an half thick.

B, A Treadle, or Foot-board, faſtened with ſcrews to E, the ſpindle of the wadler. The auger is forced into the wood by preſſing the foot lightly on the fore end of the Treadle: its inner

end

end is loaded with a ſufficient quantity of lead, ſtone, or ſome other ponderous matter at f, to draw back the auger when the foot is taken off from its fore end.

C, C, C, C, Four curved Pieces of Wood, which ſerve to ſtrengthen the poſts D 1, D 2.

D 1, D 2, Two Poſts, mortiſed into the frame A: their extreme length is twelve inches and an half each, breadth one inch and an half, thickneſs three quarters of an inch.

E, An Iron Spindle, rivetted to the under end of the braſs wadler F; which, together with the wadler F, is actuated by the treadle B.

F, The Wadler, with its claſps, ſpring, ſcrew, and pullies, (ſee Fig. 2.) is actuated by the foot preſſing gently on the treadle B, by which means the line K, being faſtened to the wadler by the preſſer G, draws forward the auger W, with its ſhaft Q, and carriage frame P, P; the ſhaft paſſing looſely through the crown-wheel S.

G, The Preſſer, conſiſts of two flat pieces of iron, faſtened together with a joint or hinge: the long or inner plate, is faſtened to the wadler F, with two ſcrews, as repreſented in Fig. 2. In the under end of the ſhort, or moveable plate, there is an aperture, or opening, for a ſmall ſteel ſpring, which ſerves to open the jaw of the Preſſer, and looſen the line, when the machine is to be ſet from one degree to another.

H, A winged Screw, which ſerves, occaſionally, to open or preſs the jaw tight on the line K, when the machine is properly ſet to the degree required.

I, I,

I, I, Two Braſs Pullies, faſtened to the ears of the wadler F, for the line K to paſs over.

K, A Line, or Cord, which paſſes over the pullies I, I, Y, Y, &c. interſecting over the ears of the wadler F, and faſtened with iron pins O, O, to the end of the carriage-frame, or croſs bars P, P.

L, An Iron Pin, which paſſes through the winch poſt D 2, and ſerves to point out the degrees marked N 2, the ſemicircular frames or arched braſs plate of the machine.

M, A Winged Screw, which ſerves to fix the machine, wh n ſet to the degree required.

N 1, N 2, Two arched Braſs Plates, whoſe radiuſes are four inches and an half each, three quarters of an inch broad on their rims, and a quarter of an inch thick on their periphery. Theſe plates are faſtened together with three turned pillars a, a, a. The diſtance between theſe Plates is one inch and an half: on the curved margin of the Plate N 2, there is an index to ſhew how to ſet the auger to any degree of elevation or inclination; and, on its ſtraight edge, or margin, there is a large notch, or opening, for the crown-wheel S, to paſs through, and be in contact with the pinion V. On the curved margin of Plate N 1, there are nine braſs pullies, on which the line K paſſes over, and interſects over the ears of the wadler, as before-mentioned.

O, O, Two winged Iron Pins, with a ſmall hole in each of them for the line K to paſs through. Theſe pins, being a little taper, are eaſily fitted tight into the holes in the ends of the croſs bars

bars P, P, of the carriage, and ſerve to draw the line to a proper tenſion.

P, P, The Croſs Bars of the carriage frame, are one inch and an half long, half an inch broad, and a quarter of an inch thick. There is a jaw, or notch, in each end of theſe Bars, properly fitted to the ribs R, R, in the ſtraight margin of the plates N 1, N 2. The ſhaft of the auger turns in theſe Bars, and is forced forward and backward by the preſſure of the foot on the treadle B, as before mentioned.

N. B. One of the croſs bars is not ſeen in the perſpective view, being concealed by the crown-wheel S.

Q, The Shaft of the Auger, is four inches and ten-twelfths long, from ſhoulder to ſhoulder, and four-twelfths ſquare, with a hole in its fore end to receive the ſhanks of the Auger.

R, R, A Rib, or Rabbet, in each of the ſtraight margins of the arched plates N, N. Theſe ribs ſuſtain and direct the carriage with its ſhaft, auger, &c. in their progreſſive and regreſſive motions. One of the R's, is not ſeen in this view, being on the inſide of the arched plate.

S, A Crown Wheel, actuated by the pinion V; it is two inches three-eighths in diameter, and has forty-eight teeth. Its axis is a braſs collet, five-eighths of an inch in diameter, and five-eighths of an inch long; with a ſquare hole through it for the ſhaft Q to paſs and repaſs freely, by the preſſure of the foot on the treadle B. The other ſurface of the collet is turned off round, and works in the croſs brace P.

T,

T, A Braſs Cock, faſtened with wood ſcrews to the poſt D 2. The axis of the pinion V, and alſo the axis or center pin of the arched plate N 2, both turn in the hole e, of this cock. See Fig. 3.

V, A Braſs Pinion, one inch three-ſixteenths in diameter, and five-twelfths of an inch broad on its periphery, with twenty-four teeth. One end of its axis works in the braſs cock T, and the other paſſes through the poſt D, and is actuated by the winch Z.

U, An Iron Pin, which ſerves to regulate the depth of the hole, by moving it to the different holes in the ſtraight margin of plate N 2.

W, An Auger, properly fitted to the ſquare hole in the end of the ſhaft Q.

X, A Screw, with which the auger is faſtened to the ſhaft Q.

Y, Y, &c. Nine Braſs Pullies, faſtened with ſcrews to the arched plate N 1.

Z, The Winch, with which the auger is worked.

a, a, a, Three Braſs Pillars, ſcrewed to the plates N 1, N 2.

f, A Lead, or Stone Weight, faſtened to the inner end of the treadle.

FIG. 2.

E, The Spindle of the wadler F.

F, The Wadler.

G, The Preſſer, with its ſpring.

H, The winged Screw, with which the preſſer is forced tight to the line K.

I, I, The Pullies of the Wadler.

FIG. 3.

Part of the plate N° 2, with its axis d, which turns in the hole e, in the braſs cock T.

FIG. 4.

T, The Braſs Cock, which contains the pinion V.

e, The Hole, in which the pivots of the pinion V, and of the arched plate N 2, revolve.

FIG. 5.

V, The pinion, with its winch Z.

C, The Pivot of the Pinion, which turns in the hole e.

Every perſon who makes uſe of an auger, the uſual way, knows by experience, that he never can ſo properly exert his ſtrength in this operation, as when he bores down perpendicular, with his body leaning over his work; and it is very evident, that every degree of elevation of the auger from the aforeſaid direction, his power is diminiſhed and of leſs effect, conſequently his labour will

will be greater, and his work proportionably retarded, inſomuch that a man can bore four holes at leaſt with the auger down perpendicular, in the ſame ſpace of time he can bore one with much leſs trouble in the contrary direction; but with this machine, the force and diſpatch is equally the ſame in all directions; it is certain, alſo, that the action of the auger, in the uſual way of boring, is diſcontinued twice in every revolution; but with this machine its motion is continued with equal force and velocity, till the auger has bored to the depth required. Another defect in the common method is, the unſteady and irregular motion of the auger at its firſt entrance into the wood, by which the holes are bored very crooked and moſt commonly larger without than within, and very wide of the direction or point aimed at, eſpecially if the wood proves hard and knotty, and likewiſe when the holes are bored of any conſiderable depth in the wood. There is alſo a great deal of loſs of time and trouble in picking the wood with a gouge before it can be pierced with the auger; but all theſe defects are entirely obviated by the aforeſaid machine, which was examined by the Committee of Mechanics, who was of opinion that the ſeveral defects in the common method of boring auger holes are remedied by Mr. William Bailey's machine and method of working; and it appeared to the Committee, that his machine will anſwer the end propoſed of boring auger holes in ſhips, &c. more commodiouſly and advantageouſly than by the common methods: therefore it was the opinion of the Committee, that Mr. Bailey merited a bounty of fifty pounds for his invention of the aforeſaid machine; to which the Society agreed, February 25, 1761.

CHAP. IX.

A Deſcription and Explanation of Mr. PHINEAS COOKE'S *new conſtructed Spiral Auger.*

FIG. 1.

A ſhort View of the Auger.

A, THE Head of the Auger, in which there is a round hole one inch and a quarter diameter, to receive the drift or wooden handle which turns the auger.

B, The Shank of the Auger, is ſix inches and an half long, and five-eighths of an inch ſquare at its upper end, having its edges or angular points taken off.

C, An endleſs Screw, with a double worm or thread a quarter of an inch thick, and flat on their edges; theſe worms cut two ſpiral chips which paſs through the two concave ſpiral channels of the auger, and are gradually diſcharged therefrom without drawing out the auger till it has bored a hole full three feet deep, or any other depth required.

D, The Point of the Auger, is a taper ſcrew with a double worm like a gimblet, which pierces the wood much eaſier and truer than common augers, and requires no picking with a gouge, which in the uſual method is an unavoidable operation attended with a great deal of trouble and loſs of time. It has been proved

proved by repeated experiments, that this inſtrument does not want to be drawn out of the wood to diſcharge the chip, which is alſo the occaſion of much labour and loſs of time in boring with a common auger, as the accumulated chip in its cavity muſt be taken out every four or five inches of wood bored therewith.

A trial of this new conſtructed auger was made in fir, oak, beach, and mahogany, in preſence of the Committee of Mechanics, who was of opinion that it effectually anſwered the purpoſe of diſcharging the chip during the time of boring; that it works more freely, is withdrawn more eaſily than common augers of the ſame bore, and promiſes to be a tool of great uſe in ſhipbuilding, &c. It was therefore reſolved to recommend to the Society to give a bounty of thirty guineas to Mr. Cooke, for his invention, he leaving the inſtrument with the Society for the uſe of the public; to which the Society agreed, May 1, 1770.

CHAP.

CHAP. X.

FIG. 1.

A front View of the PISTON *of Mr.* BLANDFORD's *Pump.*

A, AN Iron Pin, or Joint, to which the ſtaff or brake of the pump is faſtened, and is the center of its motion.

B, A ſquare Iron Rod, whoſe under end is rounded off and fitted tight into a hole bored through the piſton, to which it is faſtened with an iron key F, through an aperture in the under end of the ſaid Rod.

C, A round Plate of Braſs, or Iron, one inch diameter, and a quarter of an inch thick, with a round hole in the middle of it for the under end of the rod to paſs through; this Plate is forced up tight againſt the ſhoulders of the rod B, by the iron key F, by which means the piſton E, is very eaſily taken off and on, and well faſtened to the rod, and the leather cap D, preſſed ſo cloſe to the middle of the piſton, as not to yield too much to the force of the water, as it paſſes the cavities of the piſton.

D, A round Piece of Leather (properly dreſſed for the purpoſe) fitted ſo full to the circumference of the piſton, as to fill up the tube, or hollow cylinder, in which it works.

E, A Piſton, made of wood, five inches and an half long, with four concave channels for the water to paſs through; by this ingenious contrivance the water paſſes through the piſton and box

with

with much leſs obſtruction than it does through common piſtons, &c. it is worked with leſs friction and the leather leſs liable to wear; and by the experiments made with this new Piſton and box before the Committee, it was found that they are leſs liable to be obſtructed by lumps of coal, ſtones, chips, &c. it is very evident, alſo, that they are much ſooner taken in and out, and more eaſily leathered and repaired, than common piſtons, &c. and it is very probable that, if this new conſtructed Piſton was to be made of caſt braſs, inſtead of wood, it would be a conſiderable improvement to this uſeful invention.

F, An Iron Key, or Wedge, driven through an aperture in the under end of the rod B, and ſerves to faſten the piſton tight to its place.

FIG. 2.

A Plan of the Box, made on the ſame Principle as the Piſton.

G, The Box, is five inches diameter on the face, or upper ſide, four inches and three-eighths at the bottom, and three inches and three-quarters long.

H, The End of the Iron Pin and Key, with which the leather cap is faſtened to the box.

E, One of the concave Channels of the box.

FIG.

FIG. 3.

B, A Section of the Rod.

E, The Piſton, repreſented with its round plate, or leather cap, to ſhew its face, or upper ſide.

This Pump was tried ſeveral times with a common pump, at the Society's office, in preſence of the Committee of Mechanics; and, at the laſt trial, it appeared to the Committee, at the cloſe of the laſt experiment, that the pump of the old conſtruction was entirely choaked, and the leather quite worn through ſo as not to be worked, and that the new-conſtructed Pump was worked with eaſe. The Committee, therefore, reſolved to recommend to the Society, to give Mr. Blandford a bounty of thirty guineas for his new-invented Piſton and Box, he leaving the ſame with the Society for the uſe of the public. To which the Society agreed, March 14, 1770.

CHAP.

CHAP. XI.

A Description and Explanation of Mr. DELIVITZ'S DOOR HINGE.

FIG. 1.

A View of the HINGE *with all its Parts put together.*

A, A Brass Socket, or Tube, seven inches and eight-twelfths long, (exclusive of the ball and acorn C;) and seven-twelfths of an inch diameter, inside measure. This Socket, with its wing B, is made of one entire piece of plate brass, which being divided breadthwise into three equal parts, the middle division, when properly bended, makes the Socket or Tube A; and the two outside divisions, when doubled together, make the wing B, whose breadth is one inch and an half, and thickness about one-eighth of an inch.

B, The two outside Divisions of the Brass Plate, which being doubled together are in contact with each other, as before-mentioned; these divisions are cemented together with soft solder, and perforated with three holes for wood screws to fasten to the door.

C, C, Two ornamental Balls and Acorns, two inches and an half long, including their shanks, indicated by the dotted lines at the end of the socket: their diameters are three-fourths of an inch. These Ornaments are made of cast brass, turned in a

lathe, and fitted tight into the ſockets, to which they are cemented with ſoft ſolder.

E, A fixed Ratchet Roller, two inches and ſix-eighths of an inch long, excluſive of its ſhort cylinder, or gudgeon, I; this fixed Ratchet-Roller is inſerted into the ſocket of the under wing, and faſtened thereto with ſoft ſolder, and an iron pin through the ſocket and cylinder, as repreſented in Fig. 6.

F, A ſpiral Steel Spring, inſerted into the ſocket A; its thread or worm is four-twelfths of an inch broad, and conſiſts of ſixteen circumvolutions extending from one end to the other of the ſocket; its upper end is capped with an iron plate, in which there is a ſquare hole to receive L, the ſhank of the ratchet-roller E; this ſhank ſuſtains the upper end of the ſcrew, and prevents it from turning in the ſocket when it is actuated by the moving ſocket A, with the opening of the door.

G, The Spindle or Axis of the click ſpring, paſſes through a ſmall hole in the nut of the click, projecting three-ſixteenths of an inch beyond it, and faſtened to the fixed wing with two ſmall ſtaples, as ſet forth in the deſcription of the click-ſpring D.

H, A ſmall Steel Clamp, let in even with the ſurface of the fixed wing, and rivetted thereto as a ſtay to the ſpring, &c.

I, The ſhort Cylinder, or Gudgeon, of the upper end of the ratchet-roller, is inſerted into the mouth of the upper ſocket M, Fig. 2. This ſocket is ſupported on the ſhoulder of the under ſocket, and the upper end of the cylinder I, which, with its wing, &c. is faſtened to the door caſe, and is the gudgeon or center on which it turns.

K,

K, The Shank of the Cylinder, ſix inches three-fourths long, and four-twelfths of an inch thick; the Shank paſſes through the ſpiral ſpring and its ſocket, leaving a ſmall interval between the ſpring and the Shank.

L, The upper End of the Shank, is flatted and properly fitted to the ſquare hole in the cap of the ſpiral ſpring F; its uſe is to prevent the ſpring from turning in its ſocket when actuated by the opening of the door, which motion is counteracted by the elaſtic power of the ſpring; which elaſtic power may be made greater or leſs according as the ſpring is raiſed or twiſted up by the ratchet roller and its click.

M, The Mouth, or under End of the door-ſocket, &c. turns on the upper end of the cylinder I, reſting on the ſhoulder or upper end of the fixed door-caſe ſocket and wing N.

N, The inner End of the ſpiral ſpring, bended at right angles with the ſhank and ſocket, and let into an opening or aperture in the under end of the wing B, which wing and ſocket moves with the door, and by the elaſtic power of the ſpring is thrown faſt as afore-mentioned.

This new invented door hinge was examined by the Committee of Mechanics, who reſolved that Mr. Delivitz was deſerving of a bounty of fifteen pounds; to which reſolution the Society agreed, Feb. 3, 1768.

N. B. This hinge has been applied to the Committee room door of the Society, and has been in conſtant uſe ever ſince the year and month above-mentioned, and fully anſwers the purpoſe for which it is intended.

CHAP.

CHAP. XII.

A Deſcription and Explanation of Mr. JOSEPH JACOB's *new-conſtructed* CARRIAGE SPRINGS.

A, B, TWO Spiral Springs, whoſe actions and elaſtic powers are united by an horizontal ſteel bar.

C, An horizontal Steel Bar, connected to the ſpiral ſprings, the ſhackles F, F, &c.

D, D, Two Steel Arms, whoſe upper ends are faſtened to the inner ends of the ſpiral ſprings, or plates, A, B, and their under ends to the bar C.

E, E, Two curved Iron Supporters, with eyes, or holes, in their upper ends, to receive the ends of the bar C.

F, F, Two Shackles, that receive the braces to which the body of the carriage is ſuſpended; theſe Shackles being depreſſed by the weight of the carriage, the ſprings A, B, are thereby uniformly wound round the bar C.

G, H, The Frame of the Carriage, to which the ſprings and the curved ſupporters are faſtened.

I, I, Two Steel Arms, faſtened with feathered keys to the ends of the bar C, and the ſhackles F, F.

According to the common conſtruction of coaches, &c. the body is ſuſpended on four ſprings, independent of each other; by which means it frequently happens, from the different poſition

of

of carriages, on oblique planes, or ſudden paſſing over rough and uneven ground, that one or other of the ſprings are ſubject to almoſt the whole weight of the body of the carriage; conſequently, if each of theſe four ſprings be proportioned only to a fourth part of the weight of the body, that ſpring on which almoſt the whole weight falls, muſt be overpowered; or, if it be equal to the weight ſuſtained, it muſt ceaſe to act as a ſpring, when only charged with a fourth part of the whole weight. The new-invented ſprings before-mentioned, are altogether free from thoſe inconveniencies; as each ſpring, in every poſition, muſt neceſſarily bear an equal proportion of weight. This will appear very evident, from the following obſervations: if the whole weight which the two ſprings A and B are capable of ſuſtaining, be ſuſpended on the ſhackle F of the ſpring B, the ſpring A will have an equal proportion of the weight, and be uniformly wound up with the ſpring B; and if by any accident one ſpring ſhould fail, the other would ſupport the body of the carriage, without any alteration in the poſition of it; or ſhould both ſprings happen to fail, the ſhackles F, F, with the braces, would reſt upon the curved ſupporters E, E, and the body of the carriage remain perfectly upright, ſafe and ſecure.

N. B. The play of the ſprings is eaſily regulated for any weight, and the temper or elaſtic power of them regulated, by lengthening, or contracting, the arms D, D, and I, I, to which the ſprings and ſhackles are connected.

A model of Mr. Jacob's carriage ſprings, and alſo a ſet of large ſprings of the ſame conſtruction, now in uſe in a gentleman's carriage,

carriage, were examined by the Committee of Mechanics, who was of opinion that the application of the ſprings, in Mr. Jacob's wheel carriage, is new, ſimple, ingenious, and ſafe: they reſolved, therefore, to recommend to the Society, that twenty guineas be given to Mr. Jacob, he leaving his model with the Society for the uſe of the public: to which the Society agreed.

CHAP. XIII.

A Deſcription and Explanation of Mr. ABRAHAM STAGHOLD'S *new conſtructed Jack.*

FIG. I.

A Front View of the Jack.

A. THE Pedeſtal, or Stock of the Jack, is two feet two inches long, ſeven inches broad, and four inches and three quarters thick; in the middle of this Pedeſtal there is a round hole one inch and ſeven-eighths diameter, in which the under part of the ſcrew G, is inſerted, and moved freely up and down with the winch I, Fig. 3.

B, An endleſs Screw, with a double worm, or thread, three inches and an half long, from ſhoulder to ſhoulder, and one inch

inch and an half diameter; the pivots of the Screw turn in two iron plates faſtened to the head of the pedeſtal.

C, An Horizontal Screw Wheel, four inches diameter, and five-eighths of an inch thick, with ten ſpiral teeth on its periphery; this Wheel, and the ſocket, or hollow cylinder E, are made of one entire piece of iron; the whole being a box, or female ſcrew, which revolves round the lifter, or ſcrew G, which together with the Wheel C, is put in motion by the endleſs ſcrew and winch B, I.

D, A Piece of Braſs three inches diameter, and half an inch thick with a hole in the middle of it one inch and ſeven-eighths diameter, for the ſcrew G to paſs freely through. This piece of Braſs ſuſtains the ſcrew-wheel C, box E, ſcrew G, and whatever weight is to be raiſed on the points H, and K.

E, A Box, or hollow Cylinder, two inches and five-eighths long, and two inches and one-fourth diameter; this Box is a female ſcrew which revolves round the ſcrew G, and is actuated by the winch I, as before-mentioned.

F, An Iron Tube, brazed to the iron cap of the pedeſtal, projecting five-eighths of an inch above it, and one quarter below it; this Tube ſerves to guide the ſcrew G, as it moves up and down.

G, A perpendicular Screw, or Lifter, two feet long, and one inch and three quarters diameter, having a double worm, or thread, and an holdfaſt on its upper end.

H, A Steel Holdfaſt, with four angular points, or claws.

FIG.

FIG. 3.

I, A Winch, whoſe radius is nine inches and an half.

FIG. 2.

K, An Holdfaſt, welded to the under end of the perpendicular ſcrew, or lifter; this Holdfaſt works on the ſide of the machine, projecting two inches and an half therefrom, and is guided by a channel, or aperture, cut through the ſide of the pedeſtal.

L, L, Two angular Points, driven into the bottom of the pedeſtal to keep it ſteady on the ground.

This Machine was examined by the Committee of Mechanics, who was of opinion that Mr. Staghold's Jack is a very ingenious contrivance, and likely to anſwer the purpoſes to which ſuch machines are applied, more effectually, and with greater ſafety, than thoſe commonly uſed: the Committee reſolved, therefore, to recommend to the Society to give Mr. Staghold a bounty of ten guineas, he leaving the model of the ſaid Jack with the Society for the uſe of the public; and ten guineas more on his delivering a Jack, at large, to the Society: to which reſolution of the Committee the Society agreed, January 9, 1771.

CHAP.

CHAP. XIV.

A Description and Explanation of the Reverend Dr. HALES's *Ventilator.*

FIG. 1.

A perspective View of the Machine, with its Side laid open, taken from a Model made to a Scale of one Inch to a Foot.

A, THE Pallet, or Midriff, is eleven inches and two twelfths long, five inches and a quarter broad, and three-eighths of an inch thick, fastened with hinges to the valve frame, or partition, between the outer and inner wind chests K, L. This valve is actuated by the horizontal lever B, and perpendicular brass rod C.

B, The Lever, fourteen inches long, half an inch broad, and a quarter of an inch thick. The distance from its fulcrum, or center pin, to the center of the lifting rod, is seven inches and an half, and from thence to the extremity of its handle, five inches three fourths.

C, A Flat Brass or Iron lifting Rod, five inches long, half an inch broad, and one-eighth of an inch thick, connected to the lever, and the pallet, or midriff, to which it is fastened with two iron pins. This Rod passes through an aperture in the upper board, and sliding valve, and wooden cap fixed thereon.

D, An Octagon Poſt, three inches and an half long, and five-eighths of an inch thick, erected on a traverſe faſtened to the upper board of the inner wind cheſt. In the upper end of this Poſt, there is a mortiſe with a hole through it for an iron pin, or fulcrum, for the lever to work on.

E, A thin Braſs Slider, three-fourths of an inch long, three-eighths of an inch broad, and one-ſixteenth of an inch thick. This valve runs in a ſquare wooden cap faſtened upon the end of the upper board of the wind cheſt; in which upper board, and likewiſe in the valve and wooden cap, there is an aperture for the lifting rod to paſs through; but the apertures in the upper board and cap are nearly twice the length of that in the valve. The valve is of no other uſe than to prevent (as much as poſſible) the wind from eſcaping through the aperture of the upper board, by the central motion of the lever and lifting rod.

F, F, Two Spouts, or Trunks, two inches and an half long, and one inch and a quarter ſquare, inſide meaſure; each of theſe Spouts are fitted into a pannel which runs in a rabbet, and by the ſhifting of them, end for end, the wind may be occaſionally drawn in through the horizontal ſpout, and forced out of the perpendicular ſpout, or *vice verſa*.

G, G, The ſliding Pannels, to which the ſpouts are fixed, and occaſionally turned end for end.

H, The Valve Frame, or Partition, between the two wind cheſts.

I, I, I, I, Four Valves, two inches and a quarter long, and one inch and an half broad, and one-eighth and one-ſixteenth of an

an inch thick; theſe Valves are leathered, and faſtened to the Valve Frame, and alternately open and ſhut as the pallet, or midriff, moves up and down.

K, The inner Wind Cheſt, whoſe inſide dimenſions are five inches and two-twelfths long, and four inches deep.

L, The Stopper of the outer Wind Cheſt.

M, The Inſide of the End Stopper is excavated, as indicated by the dotted lines on the ſide of the cheſt, to prevent the wind from eſcaping by the central motion of the pallet, or midriff.

FIG. 2.

H, The Valve Frame, five inches and three-eighths long, four inches broad, and a quarter of an inch thick.

I, I, I, I, The Valves.

K, The inner Wind Cheſt, five inches and three-eighths long, two inches and ſeven-eighths broad, and four inches deep.

This model of Dr. Hales's Ventilator was preſented to the Society by Mr. Thomas Yeoman, for which he had the thanks of the Society, November 30, 1768.

CHAP.

CHAP. XV.

A Deſcription and Explanation of a Machine for ventilating Mines, taken from a Model, preſented to the Society by KEANE FITZGERALD, *Eſq*; F. R. S.

PLATE I. FIG. 1, 2, 3, 4.

An Elevation of the Machine, with ſome of its Fixtures taken off; and the Arms of the Fly repreſented broken, to ſhew the Connection of the Movements which are all made to half the Dimenſions of the Model.

A, AN arched Lever, the firſt mover, whoſe radius is two inches and ſeven-eighths; this Lever gives motion to the ſpur wheel B, &c.

B, A Spur Wheel, two inches and three-eighths diameter; this Wheel, with its ratchet, &c. turns looſely on its arbor, and is actuated by the retrograde motion of the arched lever A.

C, A Spur Wheel, two inches and a quarter diameter.

D, A Spur Wheel, one inch and five-twelfths diameter.

E, A Ratchet Wheel, ten-twelfths of an inch diameter, faſtened to the ſpur wheel D.

F, A Ratchet Wheel, three-fourths of an inch diameter.

G, The Click of the ratchet wheel E, faſtened to the frame of the machine.

H,

H, A Pinion Wheel and Fly I, I, I, I, actuated by the ſpur wheel B; the arbor of this Pinion is a crank, which gives motion to the horizontal rod N, and the perforated lever P, which works the ventilator. See Fig. 3.

I, I, I, I, The Fly, fixed to the arbor of the pinion.

K, A Spring, faſtened to the ſpur wheel B, revolves with it, and forces its click againſt the ratchet wheel F.

L, The Click of the Ratchet Wheel F, faſtened as before-mentioned to the ſpur wheel B.

M, M, Two Pinion Wheels, one is five-eighths of an inch, and the other three-eighths diameter; theſe Pinions are fixed on one arbor, which paſſes through a hole near the edge of the Wheel B, and is fixed thereto with its ſmall Pinion, connected to the Wheel D, and the other connected to the Wheel B.

N, An Iron Rod, connected to the crank and the perforated lever, which works the ventilator.

O, The Arbor of the pinion and fly, I, I, &c.

P, The perforated Lever, which works the ventilator.

Q, A Braſs Collet and center Pin, with which the lever is fixed to the poſt R.

R, A Poſt, to which the lever of the ventilator is fixed.

S, An Iron Nut, with which the fulcrum or center pin of the lever is fixed to the poſt.

T, One of the Braſs Cocks, in which the fulcrum of the arched lever turns.

U, The Cap of the Poſt.

V,

V, A round handle, with which the lever is worked to ſhew the different movements of the machine.

W, A ſquare Piece of Wood, to which the model of the machine, and the perpendicular poſt R, are fixed.

PLATE II. FIG. 5.

A, The arched Lever.

B, The Spur Wheel, actuated by the arched lever.

C, The Spur Wheel, that actuates the pinion, fly, &c.

D, The Spur Wheel.

E, A Ratchet Wheel, faſtened to the ſpur wheel D.

F, A Ratchet Wheel, three quarters of an inch diameter.

G, The Click of the ratchet wheel E.

H, A Pinion Wheel.

I, I, &c. The Fly.

K, The Spring of the click of the ratchet wheel F.

L, The Click of the ratchet wheel F.

M, M, Two Pinion Wheels, one in the front, and the other at the back of the ſpur wheel B; theſe Pinions are fixed on one arbor, and are connected to the ſpur wheels B and D, as before-mentioned.

N, An Iron Rod, connected to the crank O, and the lever P.

Q, A Braſs Collet, with which the perforated lever is fixed to the poſt R.

R, The Poſt.

S,

S, The Nut of the center pin, or Fulcrum of the perforated lever.

T, T, Two Braſs Cocks, which ſuſtain the fulcrum of the arched lever.

U, The Cap of the poſt.

V, A round Handle, faſtened to the end of the arched lever.

W, A ſquare Piece of Board, to which the model is fixed.

X, X, Braſs Pillars, with which the principal fixtures of the model are faſtened together.

Y, The Spur Wheel, fixed to the back part of the wheel B.

N. B. A more particular account of this curious machine may be ſeen in the Philoſophical Tranſactions, Vol. L. Part 2.

END OF BOOK VII.

BOOK VIII.

MECHANICS;

COMPREHENDING

A Short Account of such Mills, Models, and other Machines in the Society's Repository, as are not yet delineated.

CHAP. I.

A short Account of a HAND MILL *for grinding Corn, by Mr.* JOHN GORDON.

I. IN Consequence of the Society's Premiums, there were twenty-two Hand Mills of various sorts produced. The Committee appointed to examine them was very deliberate and circumspect in their examination of them; and, after repeated trials,

trials, and mature conſideration, they came to a reſolution that Mr. Gordon's Mill, with ſtones thirty-three inches diameter, was preferable to the other ſtone Mills. To which the Society agreed, January 11, 1758.

CHAP. II.

A ſhort Account of a STEEL MILL *for Grinding Corn, by Mr.* PETER LYON.

THE Committee came to a reſolution that Mr. Lyon's Steel Mill, five inches and three quarters diameter, was ſo nearly equal in merit to Mr. Gordon's Stone Mill, that it was difficult to diſtinguiſh which was the beſt; it was therefore propoſed to divide the premium of fifty pounds between the two candidates; to which propoſal they readily agreed, and the Society confirmed the reſolution of the Committee, January 11, 1758.

CHAP. III.

A short Account of a HAND MILL *for grinding Corn, by Mr.* SAMUEL PARSONS.

THE Committee appointed to inspect and examine the structure of the Hand Mills, caused very accurate trials to be made of them in the presence of several mealmen and others, who were proper judges of this matter; who, after several trials, declared that the Stone Mill of thirty-three inches diameter, made by Mr. Parsons, was preferable to the others, both as to goodness of the meal, and expedition in working. This determination entirely coincided with the sentiments of the Committee, who were unanimously of opinion that Mr. Parsons was intitled to the premium of fifty pounds. The resolution of the Committee was confirmed by the Society, December 6, 1758.

CHAP.

CHAP. IV.

A ſhort Account of a HAND MILL, *by Mr.* CHARLES LLOYD.

THE Committee of Mechanics read the deſcription of Mr. Lloyd's Mill, and alſo his calculations of its performance with ſtones of various ſizes, from fourteen to five inches diameter. This Mill is worked by a winch of ſeventeen inches radius, carries on its axis a crown wheel of forty cogs, a lantern of ten inches, whoſe axis, or ſpindle, carries the middle ſtone, whoſe velocity to the winch is as four to one: ſo far the conſtruction is in the common way; but further, there is fixed round the ſtone (and moving therewith in the ſame plane) an horizontal fly of twenty-three inches and an half diameter, whoſe rim, or periphery, is a cavity in ſix diviſions, ſo contrived as to carry a quantity of lead-ſhot, proportionable to the diameter, or weight of the ſtone, by which means the inventor propoſes to ſupply the dimenſions in the ſize and weight of the ſtones, by adding a proportionable quantity of ſhot in the cavity of the horizontal fly; by which he apprehends that the following advantages ariſe from the application of the ſaid hollow fly, (viz.) Firſt, Being firmly fixed round the moveable ſtone, it gives an accelerated motion, (the common effect of all flies.) Secondly, It lends its weight to the ſtones, being fixed thereto as if it were part of the ſame, by which he ſuppoſes that its additional weight makes up for the diminution of its

its bulk. Thirdly, As it moves in the ſame plane with the ſtone, its weight and diameter outreaching that of the ſtone, preſerves ſo juſt a balance, that it will not ſuffer the ſtone to be lifted up, by any accident, higher on one ſide than the other; and thereby ſtrained or thrown out of a true parallelism.

The Committee found by repeated trials and experiments, that the calculations which Mr. Lloyd had laid before them were very juſt and ſatisfactory; it was therefore the opinion of the Committee that he was deſerving of a bounty of fifty pounds; and as it appeared to them, that he had been at ſundry great charges in bringing the Mills from Wales, and a long attendance in town; the Committee, in conſideration of his great merit, recommended to the Society, to allow him the ſum of twenty guineas for the ſaid expence, on condition that he left with them the Mill, and all the different ſtones, &c. which had been uſed in the ſaid Mill.

This reſolution of the Committee was confirmed by the Society, March 25, 1761.

CHAP.

CHAP. V.

A ſhort Account of a HAND MILL, *made by Mr.* WILLIAM BAILEY.

THIS Mill was made by order of the Society; and conſtructed on the ſame principles, and of the ſame dimenſions as the Mills uſed by the peaſants in France. The original from which it was made was brought from St. Cas, by his late R—l H——ſs the D—e of Y—k.

The improvements which Mr. Bailey made to it, are as follows, (viz.) Firſt, A ſtopper with a wedge, on which is a ſcale or index, to regulate the feeding of the Mill. Secondly, A lever with a ſcale and ſcrew, to regulate the fineneſs of meal. Thirdly, The nut is a fruſtum of a cone, ſix inches diameter at the baſe, and four inches at the vertex; this nut works on two centers, by which means it turns more regularly and much eaſier than the St. Cas Mill, which turns only on one, which is the occaſion of its making bad work, and being frequently out of order.

Theſe improvements were examined and approved of by the Society, April 11, 1760.

CHAP. VI.

A ſhort Account of Mr. NICHALLS's TIDE MILL.

IN conſequence of the Society's premiums for Tide Mills, there were nine models produced, but as two of the candidates had not complied with the terms of the advertiſement, their models were rejected by the Committee appointed to examine them. The other ſeven models were minutely examined, and after repeated trials, the preference was given to the model made by Mr. James Nichalls, of Lambeth; but as the model made by Mr. Richard Lewis, appeared to have ſome merit, the Committee ſignified to Mr. Nichalls, that if he would give Mr. Lewis twenty pounds out of the fifty, it would be agreeable to them, though they had adjudged the premium of fifty pounds ſolely to him, to which recommendation of the Committee, Mr. Nichalls readily conſented, and the premium was divided accordingly; to which the Society agreed, April 23, 1760.

CHAP. VII.

A ſhort Account of a Model of a TIDE MILL, *by the Rev. Mr.* HUMPHREY GAINSBOROUGH, *of* Henly upon Thames, Oxfordſhire.

THIS Mill is conſtructed on the following principles. Firſt, A water wheel, two feet diameter, including the floats which are ten in number; a crown wheel, one foot diameter, with eighty cogs; theſe wheels are raiſed and lowered in the water (as the tide ebbs and flows) with a double lever arched at each end; its fulcrum or pivots being two thirds of the moving power, at the extremity of which a ſtronger iron chain is faſtened for raiſing and lowering the water wheel, &c. Secondly, There are flood gates which regulate, at any degree, from high to low water; the aperture, or iſſue of water, being proportioned to the floats and force of the water required. Thirdly, there is a contrivance at the head and tail of the Mill, which occaſionally makes a fall of water to each. Fourthly, A ſliding lantern pinion, with eight trundles on a perpendicular ſhaft, on the top of which ſhaft or ſpindle, is a ſpur wheel intended to turn two pair of ſtones; this lantern wheel is made to ſlide occaſionally from the upper ſide to the under ſide of the crown wheel, by which means the ſtones are at all times turned the ſame way, though the water wheel turns backwards and forwards with the flux and reflux of the tide. Fifthly, This Mill has a falſe bottom, or fence board, which is raiſed or

lowered

lowered with the water wheel, by which the dead water under the float wheel is conveyed off by a ſort of whirl-pool.

The Committee came to a reſolution that Mr. Gainſborough was deſerving the whole premium of ſixty pounds; this reſolution was agreed to by the Society, June 1, 1761.

CHAP. VIII.

A ſhort Account of a Model of a TIDE MILL, *by the Rev. Mr.* ROBERT LORD.

THE Committee took into conſideration Mr. Lord's Tide Mill, conſtructed on two caſſoons; the water wheel works both with the flux and reflux of the tide; the whole Mill riſes and falls therewith.

This Mill, by means of two face wheels (fronting each other) ſhifts on its axis to work alternately the crown wheel, ſo as to turn the ſtones conſtantly the ſame way, though the water wheel changes its motion with the tide.

It was the opinion of the Committee, that the inventor of this Mill was deſerving of a bounty of ten guineas; to which the Society agreed, May 21, 1764.

CHAP.

CHAP. IX.

A ſhort Account of a Model of a TIDE MILL, *by Mr.* WILLIAM COULTHARD.

THough this Mill is conſtructed much on the ſame principles as ſome of the other Mills, the Committee was nevertheleſs of opinion, that it had a great deal of merit, as it had many very ingenious and uſeful contrivances, particularly for drawing the flood-gates, which Mr. Coulthard has done two different ways, and in ſuch a manner, as at all times ſlowly and gradually to enlarge the aperture for the iſſue of water proportionable to the height or fall of the head of water; by this means a juſt uniform motion is obtained, and the impetus of the water on the floats of the wheel is greatly regulated.; the whole machine works truer, and is leſs liable to wear and be out of order. The manner of drawing the flood-gate, &c. is as follows, (viz.) at one end of the main ſhaft of the water wheel is an endleſs ſcrew, that turns a ſkew wheel on a long ſhaft; at the end of which long ſhaft is alſo an endleſs ſcrew, which gives motion to another ſkew wheel, whoſe axis ſerves as a ſmall roller to wind up a rope and communicates with a grooved bar, on whoſe axis is a pinion which works a rack, that is faſtened to, and moves with the flood-gate, by means of the aforeſaid rope wound round the barrel and roller.

Here follows the candidate's other method of drawing the flood-gates, &c.

This is done by a buoy, or a float, with a perpendicular rod, which communicates with a lever, whoſe ſhort radius gradually raiſes the flood-gate as the head of water, and the float ſinks under the long radius of the lever. This flood-gate (like that with the endleſs ſcrew) has a rack faſtened to the back of it; this rack is actuated by the ſegment of a circle made of wood, with teeth on its periphery, and well faſtened to the end of the ſhort radius of the lever.

The flood-gate is raiſed more or leſs as need requires, by moving the float with the perpendicular rod, nearer or farther from the fulcrum of the lever; for which purpoſe there are holes at proper diſtances, both in the lever and rod. The inventor of this machine has alſo contrived a regulating flood-gate, which admits of twelve feet head of water to the Mill, then ſhuts again of its own accord to prevent the tide from overflowing the country.

The Committee was of opinion to recommend to the Society to purchaſe the model, at a price not exceeding twenty pounds, to which the Society agreed, May 12, 1762.

CHAP.

CHAP. X.

A ſhort Account of two WIND MILLS *for draining Land, and a ſpiral Scoop Wheel and a Trough, preſented to the Society by* —— COLLIER, *Eſq.*

THE firſt model conſiſts of four water mills, with twenty-four ſcoop buckets on each wheel.

This machine is worked by the wind, having ſix angular ſails, ſet to an angle of forty-five degrees, and is conſtructed much on the ſame principles as common wind mills; the wind ſhaft carries a crown wheel which gives motion to a trundle head, fixed to the perpendicular ſhaft; at the under end of this ſhaft is fixed a crown wheel, which turns two trundle heads, fixed to the ſhafts of the water wheels; each ſhaft carries two water wheels.

The ſecond machine conſiſts of only one water wheel, which is alſo worked by the wind, with the ſails of an equal breadth from end to end. This water wheel carries twenty-four ſcoop ladles, which revolve in a trough, and include about a fifth part of the wheel; the ſides and bottom of this trough are fixed ſo cloſe to the ladles, as juſt to let them paſs without touching the bottom or ſides of the ſaid trough, by which means the ladles anſwer nearly the ſame purpoſe as the ſcoop buckets in model the firſt.

The

The ſcoop wheel and trough are made to a larger ſcale than either of the models above-mentioned, in order to ſhew by actual experiments the utility of the four ſcoop wheels in the firſt model.

CHAP. XI.

A ſhort Account of Mr. NICHALLS'S *Model of a* WIND MILL.

THE Committee having examined the two Wind Mills produced in conſequence of the Society's premium for that article, they were of opinion that the model made by Mr. Joſeph Nichalls, had great advantage over the mills in common uſe, as it worked four pair of ſtones on the ground floor, and its cap, or roof being an open frame, gave free paſſage to the wind, which in common mills is obſtructed. They therefore recommended to the Society to give Mr. Nichalls the whole premium of fifty pounds, to which the Society agreed, April 23, 1760.

CHAP. XII.

A ſhort Account of a Model of a WIND MILL *with Springs, by Mr.* RICHARD LEWIS, *of* Bow, *in* Middleſex.

THIS Mill is made with four points, or ſails, of one uniform breadth; the ſurface oppoſed to the wind is a little concave; the length of its radius (in its full magnitude) is thirty-five feet ſix inches; the length of the ſails thirty-one feet; the vanes of this Mill turn on hinges, with ſprings of wood, faſtened to each of the arms of the wind ſhafts. The ſprings are intended to keep the vanes to their proper angles, or ſituation, and the force of them muſt be equal to the quantity or preſſure of the wind the arms are capable of bearing; and if it blows harder, the ſprings yield to it, and ſuffer the vanes to turn their edges thereto, and by that means evade the force of the wind.

The Committee was of opinion that this was an ingenious invention, and capable of being very uſefully improved, but they apprehended that the conſtruction of it was rather too weak for practice; however, as this Mill was preferable to the other candidate's Wind Mill, and ſome uſeful improvements might be made to it, the Committee was of opinion that Mr. Lewis was entitled to the premium of fifty pounds.

This reſolution of the Committee was confirmed by the Society, October 7, 1761.

CHAP. XIII.

A ſhort Account of a Model of a WIND MILL, *made by Mr.* JAMES VERRIER, *of* North Curry, *in* Somerſetſhire.

THE inventor of this Mill has contrived a regiſter, or regulator, by which the vanes are ſuffered to yield and give way to the impetus of the wind, when it is too forceable; and when it is too languid, it brings the vanes up to the wind till its weight or force is ſufficient to give the Mill a proper degree of velocity; by this contrivance, the wind is juſtly weighed, regulated, and proportioned to the reſiſtance, or number of ſtones put to work; by this means alſo a regular uniform motion is obtained, and the Mill leſs liable to be ſet on fire, or deſtroyed by the violence of its motion. The inventor, to ſhew the utility of his regulator, added to his Mill ſixteen vanes more than uſual; but he intimated to the Committee that a leſs number was preferable, and that his intentions in putting ſo great a number was only to ſhew the power of his regulator.

The length of the arms of the wind ſhaft is nineteen inches; the length of the ſails are twelve inches and an half; the width at the extreme end is ſeven inches and ſeven-eighths; their width at the center end is two inches and ſeven-eighths. The ſails of this Mill are faſtened with hinges to their whips, or arms, in ſuch a manner, that the proportion of their leading and driving parts are as one to two.

The

The angle of their inclination, when firſt oppoſed to the wind, is forty-five degrees, and regularly the ſame from end to end. At the end neareſt to the center of each of the four cardinal ſails, are fixed four quadrants, by which they are kept up to the wind, or fall off from it, by means of double chains, or ropes, fixed to the four croſs arms, or braces, which are framed by their center to a long iron roller, and paſs through a hole bored lengthwiſe from end to end through the wind ſhaft. At the innermoſt end of the ſaid rod, or ſpindle, is fixed a regiſter, or regulator, with a double chain to the barrel, or roller, round which is a line with a weight which is intended to be greater or leſs according to the power of the wind, and the number of ſtones put to work; the whip, or arms, are all bolted to a thick circular rim, and croſs pieces within, by which they are much better ſecured, and much ſtronger than by the uſual method; the head wheels of this Mill are made conical, by which means the teeth fall better in contact with each other, and have a more equal wearing in all parts. The perpendicular ſhaft is much ſhorter than uſual, by which means the whole building (particularly the floor on which the ſtones are placed) is conſiderably ſtronger, and leſs liable to vibrate than in the common Mills; the ends of the whips are not entered more than two inches into the trimmer of the ſhafts, by which they are not ſo much weakened as on the uſual way.

The Committee was of opinion that the inventor of this Mill was well worthy of a bounty of fifty pounds, and accordingly recommended to the Society to give him the ſame; to which the Society agreed, December 31, 1761.

CHAP.

CHAP. XIV.

A ſhort Deſcription of the Model of Mr. GALABINE'S CRANE.

THE firſt moving power of this machine is an endleſs ſcrew turned with a winch; this ſcrew is connected to a vertical wheel, on whoſe axis is a barrel, or roller, to which is faſtened a cord with a weight; and by this ſimple contrivance only, the men can take up or let down the load with facility, without any danger of the weights returning back to injure the workmen. The Committee were of opinion that this Crane will be uſeful in mines, and for raiſing weights, and that Mr. Galabine was deſerving of a reward of twenty guineas.

This reſolution of the Committee was confirmed by the Society, Jan. 28, 1760.

CHAP.

CHAP. XV.

A ſhort Deſcription of Mr. JAMES FERGUSON's CRANE.

THIS Crane raiſes ſmall weights as ſpeedily as common Cranes, and greater weights with a proportionable diminution of celerity; it will alſo have a power ſuited to extraordinary great weights, which it will raiſe without any danger to the perſons who work it. In this model the winch is equal to the diameter, or double radius of that part of the great axis on which the rope is wound, and therefore in this caſe the power of the axis in coiling the rope, is equal to double the power applied by the operator to the winch. There are three trundles which take into the cogs of the great wheel, for giving the axis three different powers; the ſecond being double the firſt, and the third double the ſecond, under the moveable pulley below the long arm, or gib, which, being uſed with either of the trundles, doubles the powers thereof, but it needs only to be uſed when the Crane is uſed for an extraordinary great weight. A more particular account of this Crane may be ſeen in the Philoſophical Tranſactions, Vol. 45, Page 24.

The Committee reſolved, that this candidate was worthy of a bounty of Fifty Pounds; to which the Society agreed, Feb. 25, 1762.

CHAP. XVI.

A ſhort Account of a DOOR LOCK, *by Mr.* MOORE.

THIS Lock is made in the uſual manner with wards and a tumbler, to which the inventor has made ſome uſeful improvements, namely, two pin ſtoppers, on ſprings, within the Lock. The ſprings being preſſed down by the key (as on an inclined plane) make room for the key to paſs the bolt, and when the bolt is paſſed by, the two ſtoppers riſe and prevent any poſſibility of opening it, without the key belonging thereto.

The Committee was of opinion that a bounty of Twenty Pounds be given to Mr. Moore; to which the Society agreed, March 2, 1763.

CHAP. XVII.

A short Account of a Model of a FOUR WHEEL CARRIAGE, *by Mr.* THOMAS COTTON, *of* Chigwell, Essex.

THIS Carriage has a short piece of wood, mortised on each side of the under carriage of the fore wheels; the pieces are made of such a length, as to prevent the fellies of the wheels from bearing or rubbing against the perch, when the Carriage turns: by this means the locking of the fore wheels is effectually prevented, and consequently many accidents, which frequently happen by overturning when the fore wheel locks under the perch.

The Committee was of opinion that this ingenious contrivance was deserving a bounty of Twenty Guineas; to which the Society agreed, Nov. 13, 1767.

CHAP. XVIII.

A ſhort Account of a Model of a FOUR WHEEL CARRIAGE, *by Meſſrs.* CRANEFIELD, *and Co.*

THIS Carriage is ſo conſtructed as to receive Firſt, The greateſt part of the load on the hind wheels. Secondly, The application of the ſhaft will prevent the ſhaking of the thrill horſe, in rugged and irregular roads, and prevent his being thrown down, or hurt, in caſe the Carriage ſhould be overturned. Thirdly, The turning will be greatly facilitated, by means of the friction wheels, under the bed of the Carriage. Fourthly, As the fore wheels turn under the waggon, in the nature of a crane neck chariot, they can never lock, and conſequently will be leſs liable to overturn the carriages.

The Committee reſolved to recommend to the Society a bounty of Thirty Guineas to Meſſrs. Cranefield and Co. to which the Society agreed, May 20, 1765.

CHAP.

CHAP. XIX.

A ſhort Account of the Encouragement given by the Society to the Turbot Fiſhery, and the ſupplying the London *and* Weſtminſter *Markets with Fiſh by Land Carriage, &c.*

IT having been long obſerved that the Dutch are extremely aſſiduous and expert, in fiſhing for Turbot and Cod on the Britiſh coaſt; a worthy Member of the Society formed a plan for eſtabliſhing their method of fiſhing, and alſo for ſupplying the London markets with Fiſh by Land Carriage, &c. This plan was laid before the Society, who approved of it, and advanced ſeveral thouſand pounds towards carrying it into execution: and as a further encouragement to the ſcheme, the Society offered a great number of premiums to fiſhermen, and others, to engage in this undertaking.

There were alſo ſeveral premiums offered to wheelwrights, or any other perſons, who ſhould produce to the Society the beſt and lighteſt carriage with four wheels, and alſo for the beſt with two wheels, properly conſtructed for travelling with ſpeed and eaſe. In conſequence of thoſe premiums, ſeveral carriages were produced, and examined by the Committee of Mechanics, who was of opinion that the four-wheel carriage, made by Mr. Stephen Bolt, was deſerving the firſt premium of twenty pounds. That his carriage

with

with two wheels, was intitled to the firſt premium of Fourteen Pounds, and that Mr. Joachim Smith was intitled to the ſame premium of Seven Pounds.

This reſolution of the Committee was agreed to by the Society, May 12, 1762.

N. B. Theſe carriages and a complete Dutch apparatus for the Turbot Fiſhery may be ſeen in the Society's Repoſitory; a deſcription of which is ſet forth in page 265, and a perſpective view of a Dutch Fiſhing Boat, with fiſhing lines, ſnoods, and hooks, properly laid. See Plate, No 47.

CHAP. XX.

A ſhort Account of the Premiums given by the Society for Blocks, or Models of Ships, and of the Machines, with which the Velocity and Stiffneſs of the Models were aſcertained.

IN the year 1758, a very worthy Member of the Society intimated to the Society, that it was probable that ſome improvements might be made in the art of ſhip-building; and as nothing could be more worthy of the Society's notice, premiums were immediately offered for the beſt model of a Seventy-four gun Ship, and for a Twenty gun.

Theſe

Theſe models were accurately tried before a very reputable Committee, who had, previous to the trials, ordered Mr. William Bailey to make one machine for trying, within doors, the ſtiffneſs and velocity of each model, or block, and two others for trying them out of doors. The former was ſupplied with a perpetual ſtream of water by a double pump, with which two men and a boy raiſed five hogſheads, and five gallons, beer meaſure, per minute. A particular deſcription of theſe machines may be ſeen in the Society's minute books relating to this affair.

In conſequence of the above premiums, three models of ſhips were produced in the year 1759, but the candidates not having complied with the terms of the advertiſement, neither of them were intitled to the premium offered for this article.

In the year 1759, a premium of Fifty Pounds was offered for the beſt model of a ſhip to draw ſeventeen feet of water, depth of the keel included, and to be ſix hundred and fifty tons burthen. A premium of Thirty Pounds was likewiſe offered for the beſt block of twelve feet draught of water, and three hundred and eighty tons burthen, each block or model to be made to a ſcale of one quarter of an inch for a foot.

One claim in each of thoſe claſſes were produced in 1760. To each of which the Society adjudged Fifteen Pounds, part of the premium of Fifty Pounds, and Thirty Pounds to Mr. Alderidge, the only candidate.

In the year 1763, the models of ſhips for the years 1760, 1761, and 1762, were examined and tried; and the Committee reſolved that the model of a Seventy-four gun Ship, made by Mr. Conſtable,

Conſtable, in the year 1760, was deſerving the whole premium of One Hundred Pounds. That the model of a Frigate made by Mr. Nehemiah Neſbit, in the ſame year, was intitled to the whole premium of Sixty Pounds; and that Mr. William Oxenham (according to the terms of the advertiſement for the year 1761) was intitled to the ſum of Twenty Pounds for his model of a Frigate.

The models of ſhips, brought in for the year 1762, being inferior to thoſe of the former years, neither of the candidates were intitled to the premiums offered.

CHAP. XXI.

A ſhort Account of the Pumps, produced to the Society, for extracting Water out of Ships.

IN conſequence of the Society's premiums offered for the beſt Pump, or Machine, for extracting water out of ſhips, four models of machines for that purpoſe were produced to the Society; but, as the claimants had ſent models, inſtead of Pumps, or Engines, in their full magnitude, neither of them could be admitted candidates.

In the year 1765, ſeveral machines were produced and tried, on board the Jane and the Surprize Men of War, at Deptford; but as they all proved inferior to the Chain Pump, the candidates were not intitled to the premium.

Auguſt

Auguſt 2, 1766, A trial was made of Mr. Bowden's Pump, againſt the common chain pump, on board the Egmont, in Greenland Dock. The chain pump, four inch bore, and twenty-three feet eleven inches deep, was worked by ſix men, who in fifteen minutes, raiſed forty-three barrels and three gallons of water.

Mr. Bowden's Pump was thirteen inches bore on the barrels, the ſuction pipe ſix inches, and twenty-three feet eleven inches deep; ſix men worked this Pump fifteen minutes, and raiſed ſixty-five barrels and twenty-eight gallons.

Another trial was made on board the Egmont, Auguſt 21. Mr. Bowden's Pump was worked, when the ſhip was heeled nineteen degrees, five minutes; when ſix men, in nine minutes and five ſeconds, raiſed thirty-ſix barrels and thirty-five gallons of water with the very ſame Pump, as in the former trial againſt the chain pump.

The Committee came to a reſolution that Mr. Bowden's Pump was preferable to the chain pump, or any other pump, or machine, now known, or in uſe at ſea; and that Mr. Bowden was intitled to the premium of one hundred pounds for the beſt pump, or machine, for extracting water out of ſhips.

To which the Society agreed, October 29, 1766.

May 7, 1767. Trial was made of the four following Pumps, or Machines, which were examined and tried on board the ſhip Peggy, off Gun Dock, Wapping.

1. Mr. Clarke's, —— 2. Mr. Braithwait's,
3. Mr. Coleman's, —— 4. The Liverpool.

The quantity of water raiſed, and the height, being much inferior to what was performed by Mr. Bowden's, and the chain pump, neither of the candidates were intitled to the premiums offered.

September 19. The Liverpool pump was tried on board the Hulk, at Deptford, againſt one invented by Monſieur Delaniers, recommended by Mr. Daubitz, but neither of them raiſed the quantity required by the Society's advertiſement.

CHAP. XXII.

A ſhort Account of Mr. JOHN WINN'S APPARATUS *for ſaving the Lives of Sailors, &c. caſt away on a Lee Shore.*

THE inventor of this Apparatus was a ſhipwright, who was frequently employed as a pilot, to conduct ſhips into roads and harbours; and had often diſtinguiſhed himſelf for his courage and activity, in ſaving the lives and effects in ſhips caſt away on a lee ſhore. This employment excited the ingenious ſhipwright to think of ſome method of conveying men and merchandize (circumſtanced as above) to the ſhore, with more ſafety and expedition than could be done by any means yet diſcovered:

covered : accordingly, he, by close application and repeated experiments, completed an Apparatus which he had contrived for that purpose; and after several successful trials of it on ships in distress, he exhibited a model of his Apparatus in the Society's great room, where a Committee was appointed to examine it, and where the inventor was very particular in explaining the manner of its operation, which proved to the satisfaction of the Committee, who was of opinion, that the invention was ingenious, simple, and seemed calculated to answer the end proposed; they therefore resolved to recommend to the Society, to give Mr. Winn the Silver Medal of the Society, for his ingenious method of saving the lives of sailors, &c. To which the Society agreed, March 11, 1767.

N. B. Some time before Mr. Winn's decease, he tried several experiments in the Strand, and other public streets, to shew the utility of his Apparatus, in escaping from houses on fire.

In one of the experiments, in three minutes the Apparatus was fixed to the window of a second floor; and a man let himself and two boys down into the street, on the opposite side of the way, where the end of the Apparatus was fastened to a post; the man immediately worked himself up to the window again, and a woman let herself with two girls down with great ease and safety.

CHAP.

CHAP. XXIII.

A short Account of several Machines produced to the Society, for which the Inventors were rewarded with Bounties adequate to the utility of their Machines.

1. IN the year 1762, the ingenious Mr. James Ferguson, produced to the Society a model of his crane, with three powers, which was examined by the Committee of Mechanics, who resolved to recommend to the Society to give the inventor a bounty of Fifty Pounds, on condition he would leave the said model with the Society for the use of the public.

To which the Society agreed, Feb. 25, 1762.

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2. In the year 1767, Mr. Aaron Millar, of New Jersey, presented the Society with a very curious compass, and protractor, for which he had the thanks of the Society, and a bounty of Ten Guineas.

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3. In the year 1767, an expanding rod for gauging vessels, was produced to the Society by Mr. James Efford, the inventor. This machine was examined by the Committee of Mechanics, who recommended to the Society to give the inventor a bounty of Twenty Pounds; he leaving the machine with the Society.

To which the Society agreed, April 22, 1767.

N. B.

N. B. About two years after, Mr. Efford produced another expanding Rod, with conſiderable improvements, for which he had alſo a bounty of Fifteen Guineas.

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4. In the year 1768, a Machine Cart was produced to the Society, in its full magnitude, by Mr. George Black, of Berwick upon Tweed. By the machinery fixed to the Cart, one man, without cattle, can drive it on plain ground, when loaded; but the inventor's intention was only to uſe the machinery occaſionally, when the Cart is in a ſlough, or going up a hill.

The Committee appointed to examine this Cart, reſolved that the machinery, added to the Cart, appears to have ſome ingenuity in its conſtruction, and may be uſeful.

Reſolved to recommend to the Society, to give Mr. Black a bounty of Ten Guineas for his invention; he ſending a model of it to the Society, in the proportion of three inches to a foot.

To which the Society agreed, April 22, 1768.

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5. In the year 1769, a Model of a Machine for forging Wheel-tire, was produced to the Society by Mr. Thomas Hunt.

The inventor of this Model was of opinion that three ſtrokes with the ſtamper of his Machine, was ſufficient to form one length of Tire, and that three ſtrokes more would punch the holes in the ſame. This operation is performed (according to the Model) by a falling weight, ſomewhat ſimilar to the Machine for driving piles.

The Committee appointed to examine the Machine, reſolved that Mr. Hunt's method of diſcharging the falling weight, appears to be

be new, ingenious, and ſimple; and that it was the opinion of the Committee, that a bounty of Ten Guineas be given to Mr. Hunt, he leaving the Model with the Society.

Which was agreed to by the Society, April 26, 1769.

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6. In the year 1769, a portable Iron Oven for the uſe of private families, was produced to the Society, by Mr. Robert Clement, the inventor. This Oven was referred to the conſideration of the Committee of Mechanics, who examined it, and made ſeveral trials of its utility; and particularly on January 4, at which time two quartern loaves were prepared by a baker, and baked in the ſaid Oven, at the Society's Office, in preſence of the Committee; who were of opinion that the ſaid loaves were well and ſufficiently baked within the ſpace of two hours, and with a very ſmall quantity of ſea coal, and that the ſaid Oven was new, and uſeful for many purpoſes in private families, and at ſea.

Reſolved, it is the opinion of the Committee that the ſaid Oven may be heated with any other fuel; and that it be recommended to the Society to give Mr. Clement a bounty of Fifteen Guineas, he leaving the Oven the property of the Society.

To which reſolution the Society agreed, January 15, 1770.

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7. In the year 1769, a Bolting Mill was produced to the Society, by Mr. Nathaniel Stedman. This Mill was referred to the Committee of Mechanics, who examined it, and had it worked in their preſence, and was of opinion that it was new, ingenious, and uſeful, and deſerving the encouragement of the Society; and that Mr. Stedman was deſerving a bounty of Fifteen Guineas, he leaving

ing a complete Mill with the Society, for the uſe of the public; which was agreed to by the Society, January 20, 1770.

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8. In the year 1769, a model of an Hydraulic Engine for raiſing water by water, was produced to the Society, by the inventor, Mr. William Weſtgarth. This Engine came extremely well recommended by the ingenious Mr. Smeton, who has ſeen ſeveral of Mr. Weſtgarth's Engines built at large, and applied to real uſe; and is of opinion that this invention is the greateſt ſtroke of art in the Hydraulic way that has appeared ſince the invention of the ſteam engine. Mr. Smeton is of opinion alſo, that this machine is not only adapted to the raiſing water by water for draining of mines; but the ſame principles can readily be extended to the raiſing of water for ſupplying towns, gentlemen's gardens, houſes, &c. and univerſally for raiſing water from any depth, wherever a fall of water can be procured, and particularly ſo where the fall of water is at leaſt thirty or forty feet.

Mr. Smeton's judicious obſervations on this uſeful machine, were referred to the Committee of Mechanics, who examined the model, had it worked in their preſence, and reſolved, that where a fall of water can be obtained, Mr. Weſtgarth's Engine will admit of great variety in its uſe; and that his method for charging and diſcharging of the power, is new, ingenious, and effectual for the purpoſe of raiſing water in great quantities to ſmall heights, or in ſmall quantities to great heights.

Reſolved to recommend to the Society to give Mr. Weſtgarth a bounty of Fifty Guineas, he leaving his model with the Society for

the

the uſe of the public; to which the Society agreed, May 24 1769.

9. In the year 1770, a new invented Chaff Cutter, invented by Mr. William Bailey, was examined and worked againſt a common chaff cutter, in preſence of the Committee of Agriculture, who proceeded to a comparative trial between the new Chaff Cutter, and that commonly uſed; in order to which, a quantity of ſtraw was procured and weighed, and each truſs was allowed to be thirty-five pounds and an half. The common machine was worked by an experienced chaff cutter, and the new machine by a common carpenter, unacquainted in the art of cutting chaff; the new machine cut forty-three pounds and an half in thirty minutes, which meaſured ſix buſhels and two pecks; the common machine cut in thirty minutes twenty-nine pounds, which meaſured four buſhels, one peck, and a quarter. The ſtraw cut with the new machine was ſifted, and there remained one peck unfit for uſe; (but it was apprehended that the man would have made better work, and greater diſpatch, if he had known how to have laid the ſtraw properly into the machine) the chaff cut with the common machine appeared to require no ſifting; it appeared alſo that the chaff cut with this machine, was of more equal length than that cut with the new machine, even after ſifting. The Committee was of opinion that Mr. Bailey's machine was new, ingenious, and may be particularly beneficial in thoſe counties where chaff cutting is not now practiſed; and that, with written directions only, any perſon will be immediately capable of working it.

The

The Committe reſolved, that Mr. Bailey was deſerving of a bounty of Twenty Guineas, he leaving the Machine with the Society, at an expence not exceeding Six Guineas: this reſolution of the Committee was agreed to by the Society, May 31, 1770.

N. B. This Machine may be ſet, in half a minute's time, to cut the ſtraw to any degree of length, from a quarter of an inch to four inches; that, without loſs of time, the ſtraw is brought forward by every ſtroke of the knife, to the degree the Machine is ſet to: and that any perſon, by a very little practice, may work it with much greater ſafety and diſpatch, than can be done the common way.

END OF BOOK VIII.

BOOK IX.

Honorary and Pecuniary Premiums given for divers Articles in CHEMISTRY.

Honorary Premiums.

1763. TO the Rev. Mr. Jared Eliott, for producing malleable iron from American black ſand, a gold medal.

1766. To Mr. Samuel Bowen, of Georgia, for his uſeful obſervations in China, and induſtrious application of them in Georgia, a gold medal.

To Robert Doſſie, Eſq; for effectually aiding to eſtabliſh the manufacture of potaſh, in North America, a gold medal.

To Dr. William Lewis, M. B. F. R. S. for his method of aſſaying potaſh, a gold medal.

1767. To Mr. Phillippo (an Aſiatic) for introducing the Eaſtern dyes of leather, a gold medal.

1769. To Mr. James Engliſh, for cultivating rhubarb in England, a gold medal.

1770.

1770. To Dr. James Mountſey, for introducing the true rhubarb ſeed, a gold medal.

To Iſaac Jemineau, Eſq. for his zeal to promote the views of the Society, a gold medal.

Pecuniary Premiums.

1755. To Mr. Beauchamp, of Truro, in Cornwall, a premium, for cobalt from a Britiſh mine, thirty pounds.

1758. To Mr. Jacob Hagan, jun. a premium for making one hundred weight of verdigriſe, twenty pounds.

1759. To Mr. Herbert Chambers, a premium, for improvements in ſtaining marble, ten pounds.

To Jean Sifferth, a premium, for making crucibles in England, thirty pounds.

To Henry Richards, a premium, for making earthen retorts, twenty pounds.

1761. To Mr. William White, a premium, for making crucibles, thirty pounds.

To Robert Doſſie, Eſq; a premium, for diſcovering the proceſſes for edulcorating train oil, one hundred pounds.

To Mr. —— Perreneau, a premium, for myrtle wax, thirty pounds.

To Mr. John Wilſon, a premium, for dyeing cotton yarn Turkey red, fifty pounds.

To

To Mr. Anthony Bacon, a premium, for myrtle wax, twenty pounds.

1762. To Mr. Jacob Luberick, a bounty, for making of crucibles in England, twenty-one pounds.

To Mr. David Creagh, a bounty, for improvements in Papin's digeſter, thirty-one pounds, ten ſhillings.

1763. To John Bindley, Eſq; a premium, for making verdigriſe, fifty pounds.

To Mr. John Monk, a premium, for making varniſh to prevent ſteel or iron from ruſting whilſt manufacturing, twenty pounds.

To Mr. Stephen Bedford, part of a premium, for making varniſh, fifteen pounds.

1764. To Mr. Nicholas Criſp, of Bow Church Yard, London, for making zaffre and ſmalt from Engliſh cobalt, fifty pounds

To Mr. Edward Carter, a bounty, for a ſubſtitute for borax, thirty-one pounds, ten ſhillings.

To John Brindley, Eſq; a premium, for verdigriſe, one hundred pounds.

To Mrs. Parry, for extracting oil from ſeſſamum ſeed, one pound one ſhilling.

To Mr. Jeremiah Brown, of Virginia, a bounty, for making ſalt-petre in America, fifty pounds.

To Mr. Simon Spurret, of Iſleworth, Middleſex, for the invention of dyeing cotton yarn Turkey red, one hundred pounds.

1766. To Mr. Humphrey Jackſon, a premium, for dyeing cotton or linen yarn green, twenty pounds.

To

To Mr. Jacob Luberick, for making crucibles in England, fifty pounds.

1767. To Mr. John Griffell, a premium, for dyeing linen yarn yellow, forty pounds.

To Mr. John Griffell, a premium, for dyeing linen yarn green, twenty pounds.

To Mr. Phillippo (as before-mentioned) a bounty, for revealing the manner of dyeing leather red and yellow, as uſed in Turkey, one hundred pounds.

1769. To Mr. Samuel Falconbridge, a bounty, for ſal ammoniac, twenty-one pounds.

1770. To Mr. Abraham Pelling, a bounty, for glaſs for achromatic teleſcopes, thirty pounds.

END OF BOOK IX.

BOOK X.

A ſhort Account of the Honorary and Pecuniary Premiums and Bounties, given by the Society, for planting Mulberry Trees, Vines, and divers other Articles, in the Britiſh *Colonies in* America.

Honorary Premiums for planting Vines, &c.

1762. TO Mr. Carter, of Virginia, for planting vines, a gold medal.

To Edward Anthill, Eſq; for planting vines to the North of the river Delaware, a gold medal.

1770. To Edward Anthill, Eſq; for Ditto, a gold medal.

Pecuniary Premiums, &c.

1755. Paid into the hands of Benjamin Martin, Eſq; to be remitted to Meſſrs. Haberſham and Otterlenge, in Georgia, to be by them diſtributed to the ſeveral claimants for white mulberry trees, raiſed in the province of Georgia, purſuant to the Society's advertiſement, which account is as follows:

To Henry Young, Eſq; for planting the greateſt number of mulberry trees, the firſt premium, ten pounds.

To Sir Patrick Houſton, Bart. ſecond premium, five pounds.

To

To Mr. Benedict Burquin, and to Mr. Theobald Kuffer, the ſecond premium of five pounds divided between them.

1759. Paid Meſſrs. Haberſham and Otterlenge's draft, for money paid by them for producing cocoons in Georgia, eighty-ſeven pounds fifteen ſhillings and eleven-pence.

1760. Paid premiums for ſilk in Georgia, one hundred and thirty-ſix pounds two ſhillings and nine-pence three-farthings.

1761. Paid Mr. Otterlenge's draft, for premiums for cocoons, one hundred pounds thirteen ſhillings and nine-pence.

Dec. 17. Paid draft for premiums for cocoons in Georgia, ſixty-five pounds fourteen ſhillings and eight-pence.

1763. Paid Mr. Murdock Middleton, for cuttings of vines, five pounds five ſhillings.

March 26. Paid draft for premiums for cocoons in Georgia, one hundred and eighty-eight pounds fifteen ſhillings and four-pence.

Nov. 30. Paid premiums for cocoons in Georgia, one hundred and ninety pounds one ſhilling and four-pence.

Dec. 31. Paid Mr. Otterlenge's draft for premiums for cocoons, one hundred and ninety-three pounds ſeven ſhillings and ten-pence.

Jan. 1765. Paid Edward Boehm, Eſq; firſt premium for ſturgeon, fifty pounds.

31. Paid Mr. Bouryan, ſecond premium for ditto, twenty-five pounds.

April 5.

April 5. Paid Jared Engerſall, Eſq; for ſilk in Connecticut, eighty-nine pounds.

June 7. Paid Meſſrs. Hughes and Whitlock, premium, for twenty-five tons of potaſh, one hundred pounds.

Paid Meſſrs. Barnard and Harriſon, for twenty tons, eighty pounds.

11 Paid Meſſrs. Lane and Booth, for fifty-four tons, two hundred and ſixteen pounds.

July 26. Paid Mr. John Cowley, for one ton, four pounds.

Nov. 22. Paid Meſſrs. Lane and Booth, for twenty-two tons and ſix hundred weight, eighty-nine pounds four ſhillings.

Jan. 16, 1766. Paid a draft for premiums, for cocoons in Georgia, one hundred and fifty-five pounds thirteen ſhillings and eleven-pence.

March 15. Paid Mr. Humphrey Jackſon, for importing ſturgeon, fifty pounds.

May 23. Paid Meſſrs. Menzies and Co. for potaſh, ſeven pounds fifteen ſhillings.

Paid Meſſrs. Lane and Booth, for potaſh, one hundred and thirty-three pounds, fifteen ſhillings and ſix-pence.

Paid Mr. Abraham Dupries, twenty pounds fourteen ſhillings.

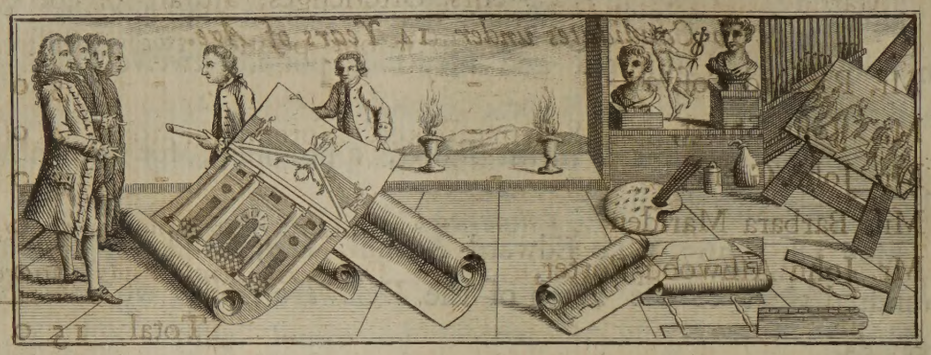
24. Paid Meſſrs. Hughes and Whitlock, two hundred and twenty-four pounds five ſhillings.

March 21, 1767. Paid Meſſrs. Otterlenges, a draft for cocoons in Georgia, two hundred and fifty-four pounds, twelve ſhillings and ſix-pence.

June 13. Paid Sir William Baker, a premium, for pearl aſh, ſix pounds two ſhillings.

May 18, 1767. To Edward Anthill, Eſq; for planting eight hundred vines to the north of the Delaware river, wo hundred pounds.

END OF BOOK X.



BOOK XI.

A ſhort Account of the Pecuniary Premiums, and Bounties, given in the Polite Arts.

AT the firſt inſtitution of the Society, the Polite Arts was the principal object of their attention; but there was no regular account kept of the candidates names, or the rewards given to them till January 10, 1755, when the following premiums were given, viz.

To Mr. James Schooler, for drawing the head of one of the candidates from the life, - - 4 0 0

And to the under-written Candidates for Drawings from Mr. Shipley's *Collection of Prints, Pictures, Drawings, Models, &c.*

To Miſs Elizabeth Keith, for drawing a head, -	4 0 0
To Mr. Elias Durnford, for ditto, - -	3 0 0
To Mr. Richard Dubore, for ditto, - -	2 0 0
To Mr. Richard Revel, for ditto - -	1 0 0
Total	14 0 0

To Candidates under 14 Years of Age.

Mr. Richard Coſway,		5	0 0
Mr. John Smart,		4	0 0
Mr. John Greſſe,		3	0 0
Miſs Barbara Marſden		2	0 0
Mr. John Aſhwood Porter,		1	0 0
	Total	15	0 0

Drawings by Boys and Girls under 14 Years of Age.

1756. Mr. John Smart,		5	0 0
Mr. William Pars,		4	0 0
Mr. Lewis Pingo,		3	0 0
Mr. Simon Taylor,		2	0 0
Miſs Barbara Marſden,		1	0 0
	Total	15	0 0

Drawings by Candidates under 17 Years of Age.

Mr. John Hall,		5	0 0
Mr. John Greſſe,		4	0 0
Mr. William Pether,		3	0 0
Miſs Elizabeth Brown,		2	0 0
Mr. James Wood,		1	0 0
	Total	15	0 0

For the beſt fancied Deſigns by Candidates under 17 Years of Age.

Mr. Elias Durnford,		5	0 0
Mr. Henry Pingo,		4	0 0
Mr. Thomas Davis,		3	0 0
Mr. William Pars,		2	0 0
Mr. William Pether,		1	0 0
	Total	15	0 0

For the beſt fancied Deſigns by Candidates under 14 *Years of Age.*

1757.	Mr. William Pars,	-	-	5 0 0
	Mr. William Parſons,	-	-	4 0 0
	Mr. Richard Earlom,			3 0 0
	Mr. Johnſon Carr,	-	-	2 2 0
	Mr. William Looker	-	-	1 0 0
			Total	15 0 0

Drawings by Candidates under 17 *Years of Age.*

	Mr. John Smart,	-	-	5 0 0
	Mr. Simon Taylor,	-	-	4 0 0
	Mr. James Gandon,	-	-	3 0 0
	Mr. William Lifford,	-	-	2 0 0
	Mr. John Edwards,	-	-	1 0 0
			Total	15 0 0

For the beſt fancied Deſigns by Youths under 17 *Years of Age.*

	Mr. Iſaac Martel,	-	-	5 0 0
	Mr. Richard Coſway,	-	-	4 0 0
	Mr. John Greſſe,	-	-	3 0 0
	Mr. Lewis Pingo,	-	-	2 0 0
	Mr. Andrew Dumford,	-	-	1 0 0
			Total	15 0 0

For the beſt fancied Deſigns by Girls under 17 *Years of Age.*

	Miſs Barbara Marſden,	-	-	5 0 0
	Miſs Sarah Kirby,	-	-	4 0 0
	Miſs Hannah Chambers,			3 0 0
	Miſs Mary Chambers,	-	-	2 0 0
	Miſs Eleanor Clark,	-	-	1 0 0
			Total	15 0 0

For the best Drawing of an human Figure from Plaister, by Youths under 18 Years of Age.

1758.	Mr. John Smart,	- -	5 0 0
	Mr. Richard Cosway,	- -	4 0 0
	Mr. John Gresse,	- -	3 0 0
	Mr. William Pars,	-	2 0 0
		Total	14 0 0

Drawings or Compositions of Ornaments, by Youths under 15 Years of Age.

Mr. Andrew Durnford,	- -	5 0 0
Mr. Lewis Pingo,	- -	4 0 0
Mr. William Willis,	- - -	3 0 0
Mr. John Bellingham,	- - -	2 0 0
Mr. Joseph Bellingham,	- -	1 0 0
	Total	15 0 0

Drawings, after Prints, by Youths under 16 Years of Age.

Mr. Richard Earlom,	- -	5 0 0
Mr. William Parsons,	- - -	4 0 0
Mr. Johnson Carr,	- -	3 0 0
Mr. Simon Taylor,	- -	2 0 0
Mr. Richard Cross,	- -	1 0 0
	Total	15 0 0

Drawings

Drawings or Compositions of Ornaments, by Youths under 18 Years of Age.

Mr. Henry Pingo,	-	-	5 0 0
Mr. William Chinnery,	-	-	4 0 0
Mr. Frederick Millar,	-	-	3 0 0
Mr. Mr. James Gandon,	-	-	2 0 0
Mr. Matthias Stable,	-	-	1 0 0
		Total	15 0 0

For the best Drawings or Compositions of Ornaments, by Girls under 18 Years of Age.

Miss Hannah Chambers,	-	-	5 0 0
Miss Mary Pingo,	-	-	4 0 0
Miss Sarah Kirby,	-	-	3 0 0
Miss Sarah Clerkson,	-	-	2 0 0
Miss Ann Henshaw,	-	-	1 0 0
		Total	15 0 0

For the best Drawings or Compositions of Ornaments, by Girls under 15 Years of Age.

Miss Mary Moser,	-	-	5 0 0
Miss Barbara Marsden,	-	-	4 0 0
Miss Mary Chambers,	-	-	3 0 0
Miss Eleanor Clark,	-	-	2 0 0
Miss Ann Schooler,	-	-	1 0 0
		Total	15 0 0

For the beſt Drawings in the Claſs under 14 Years of Age, who have not been taught or inſtructed.

Mr. John Ruſſell,	-	-	5 0 0
Mr. George Smithſon,	-	-	4 0 0
Mr. William Williams,	-	-	3 0 0
Mr. E. Waters,	-	-	2 0 0
Mr. Benjamin Valliamy,	-	-	1 0 0
		Total	15 0 0

The above Premiums confirmed January 11, 1758.

Model of Face, and reverſe, in wax, by Mr. Joachim Smith, under 22 years of age,	-	10 10 0
Mr. Nathaniel Smith, for a model in clay,	-	15 15 0
	Total	26 5 0

Claſs 58. *Drawing of an human Figure under 22 Years of Age.*

1759. Mr. Nathaniel Smith,	-	-	5 5 0
Mr. William Pethers,	-	-	4 4 0
Mr. Joſeph Nollekens,	-	-	3 3 0
Mr. Richard Coſway,	-	-	2 2 0
Mr. Michael Steel,	-	-	1 1 0
		Total	15 15 0

Claſs 60. *For the beſt Drawing after Nature, under 17 Years of Age.*

Mr. Nathaniel Smith, the only candidate in this claſs, 3 3 0

Claſs

Claſs 61. *Drawings after Nature, under* 17 *Years of Age.*

Mr. William Pars,	5	5	0
Mr. Simon Taylor,	4	4	0
Mr. Bellingham,	3	3	0
Mr. Matthias Stable,	2	2	0
	14	14	0

N. B. Four candidates only in this claſs.

Claſs 62. *For the beſt Drawings or Compoſitions after Nature, under* 20 *Years of Age.*

Miſs Rachael Chambers, the only candidate in this claſs, 5 0 0

Claſs 63. *For the beſt Drawings of Ornaments, under* 18 *Years of Age.*

Miſs Mary Moſer,	5	5	0

To whom the Society gave alſo a ſilver medal for extraordinary merit.

Miſs Mary Chambers	4	4	0
Miſs Hannah Chambers,	3	3	0
Miſs Mary Pingo,	2	2	0
Miſs Hannah Ruſh,	1	1	0
Total	15	15	0

Claſs 64. *For the ſame under* 18 *Years of Age.*

Mr. Lewis Pingo,	4	4	0
Mr. John Edwards	3	3	0
Mr. William Sharp,	2	2	0
Total	9	9	0

Clafs 65. *For the beſt Drawings of an human Figure, under 18 Years of Age.*

Mr. John Greſſe,	- - -	5 5 0
Mr. William Pars,	- -	4 4 0
Mr. Simon Taylor,	- -	3 3 0
Mr. Johnſon Carr,	- -	2 2 0
Mr. Lewis Pingo,	- -	1 1 0
	Total	15 15 0

Clafs 66. *For the beſt Drawings of any Kind, under 18 Years of Age.*

Mr. Michael Rooker,	- -	5 5 0
Mr. John Ruſſell,	- -	4 4 0
Mr. George Herbert,	- -	3 3 0
Mr. Hugh Barron,	- -	2 2 0
Mr. William Willis,	- -	1 1 0
	Total	15 15 0

Clafs 67. *For the beſt Drawings for Cabinet Makers, under 22 Years of Age.*

Mr. Francis Town,	- -	6 6 0
Mr. Henry Pingo,	- -	5 5 0
Mr. William Alderſon,	- -	4 4 0
Mr. Joachim Smith,	- -	3 3 0
Mr. William Chinnery,	- -	2 2 0
	Total	21 0 0

Claſs 56. *Premiums confirmed the 28th of* March, 1759, *for Drawings at the Academy in St.* Martin's Lane, *under 20 Years of Age.*

Mr. David Martin,	-	-	10 10 0
Mr. John Mortimer,	-	-	8 8 0
Mr. William Sherlock,	-	-	7 7 0
Mr. William Woolet,	-	-	5 5 0
		Total	31 10 0

Claſs 57. *Drawings from the Duke of* Richmond's *Collection, under 21 Years of Age.*

Mr. John Mortimer,	-	-	9 9 0
Mr. John Greſſe,	-	-	7 7 0
Mr. William Pether.	-	-	5 5 0
Mr. Richard Earlom,	-	-	4 4 0
		Total	26 5 0

Claſs 59. *For Landſcapes, under 19 Years of Age.*

Mr. John Greſſe,	-	-	8 8 0
Mr. John Hakewell,	-	-	6 6 0
Mr. James Gamden,	-	-	4 4 0
Mr. William Pars,	-	-	2 2 0
		Total	21 0 0

Claſs 72. *For the beſt Model in Clay, under 22 Years of Age.*

April 25, 1752. Mr. Joſeph Nollekens - 15 15 0

Claſs 73. *For the beſt Model in Clay, under 19 Years of Age.*

Mr. John Bacon, - - 10 10 0

Claſs 74. *For the beſt Model or Compoſition of Ornaments, under 22 Years of Age.*

Mr. William Sheffield, — — 10 10 0

Claſs 75. *For the beſt Model or Compoſition of Ornaments, under 19 Years of Age.*

Mr. William Hodges, — — 2 2 0

Claſs 76. Mr. William Pars, — — 3 3 0

Mr. Albertus Pars, - - 2 2 0

Total 5 5 0

Claſs 177. *For the beſt Medallion.*

Mr. Lewis Pingo, - - 10 10 0

May 23. Paid Mr. John Pingo a Premium for a Copper Medal, - 21 0 0

Feb. 13, 1760. Paid Mr. John Pingo, for cutting a new reverſe to ditto, - - 10 10 0

Mr. Thomas Smith, for an Intaglio, - - 10 10 0

Feb. 27. Mr. Lewis Pingo, for a Medallion, - 10 10 0

Mr. John Pingo, for a Copper Medal, - 21 0 0

Total 52 10 0

Claſs 170. *For a Model in Clay, under 25 Years of Age.*

March 19. Mr. Joſeph Nollekens, - - 31 10 0

Claſs 71. *For a Model in Clay, under 25 Years of Age.*

Mr. John Bacon, - - 15 15 0

Claſs 72. *A Gratuity for Modelling.*

Mr. Joſeph Nollekens, - - 10 10 0

Claſs 73. *For Modelling, under 22 Years of Age.*

Mr. Nathaniel Smith, firſt premium, - -	9	9	0
Mr. George Parbury, ſecond premium, - -	4	4	0
Mr. John Daintree, third premium, - -	2	2	0
Total	15	15	0

Claſs 74. *Under 19 Years of Age.*

Mr. John Scott, firſt premium, - -	6	6	0
Mr. Philip Regnart, ſecond premium, - -	4	4	0
Total	10	10	0

For Hiſtorical Pieces.

April 9. Mr. Robert Edge Pine, firſt premium for an hiſtorical piece, - -	105	0	0
Mr. Andrew Chevalez Caſſali, ſecond premium for an hiſtorical piece, - - -	52	10	0
Total	157	10	0

Claſs 82. *For Landſcapes.*

Mr. George Smith, firſt premium,	-	-	50 0 0
Mr. John Smith, ſecond premium,	-		25 0 0
		Total	75 0 0

Claſs 50. *Drawings at the Academy in St.* Martin's Lane, *under 24 Years of Age.*

Mr. Richard Coſway, firſt premium,	-	-	10 10 0
Mr. John Mortimer, ſecond premium,	-	-	8 8 0
Mr. David Martin, third premium,	-	-	7 7 0
Mr. Chriſtopher Norton,	-	-	5 5 0
		Total	31 10 0

Claſs 51. *From the Duke of* Richmond's *Gallery, under* 21 *Years of Age.*

Mr. John Trotter, firſt premium,	-	-	6 6 0
Mr. Charles Cartwright, ſecond premium,	-	-	4 4 0
		Total	10 10 0

Claſs 52. *For the beſt Drawings of an human Figure, from Caſts, or Baſſo Relievo, with Chalk only, under* 20 *Years of Age.*

Mr. William Lawrenſon, firſt premium,	-	-	6 6 0
Mr. Richard Earlom, ſecond premium,	-	-	4 4 0
Mr. Henry Leake, third premium,	-	-	3 3 0
Mr. William Parry, fourth premium,	-	-	2 2 0
		Total	15 15 0

Claſs 53. *For the beſt Drawings of an human Figure, after a Print, under* 16 *Years of Age.*

Mr. William Parſons, firſt premium,	-	-	5 5 0
Mr. John Ruſſell, ſecond premium,	-	-	3 3 0
Mr. Samuel Ireland, third premium,		-	2 2 0
		Total.	10 10 0

Claſs 54. *Landſcapes after Nature, under* 19 *Years of Age.*

Mr. John Hakewell, firſt premium,	-	-	8 8 0
Mr. Johnſon Carr, ſecond premium,		-	6 6 0
Mr. John Edwards, third premium,	-	-	4 4 0
Mr. Michael Rooker, fourth premium,	-	-	2 2 0
To Mr. Thomas Vivarez, a gratuity,	-	-	2 2 0
		Total	23 2 0

Claſs 55. *For the beſt Compoſitions, after Nature, of Birds, Beaſts, &c. under* 20 *Years of Age.*

Mr. Simon Taylor, firſt premium,	-	-	6 6 0
Mr. William Willis, ſecond premium,	-	-	2 2 0
		Total	8 8 0

Claſs 57. *For the beſt Drawings or Compoſitions, under* 20 *Years of Age.*

Miſs Mary Vivarez, the only candidate,	-	5 5 0

Claſs

Claſs 58. *For the beſt Drawings or Compoſitions, under 15 Years of Age.*

Miſs Hannah Chambers, firſt premium,	-	-	4 4 0
Miſs Mary Chambers, ſecond premium,	-	-	3 3 0
		Total	7 7 0

Claſs 59. *For the beſt Drawings or Compoſitions for Weavers, under 22 Years of Age.*

Mr. Henry Pingo, firſt premium,	-	-	5 5 0
Mr. William Herbert, ſecond premium,		-	5 5 0
Mr. John Bellingham, third premium,	-	-	3 3 0
Mr. William Chinnery, fourth premium,	-	-	2 2 0
		Total	15 15 0

Claſs 61. *For Drawings of an human Figure or Head, after Drawings or Prints, under 14 Years of Age.*

Mr. John Pye, firſt premium,	-	-	4 4 0
Mr. James Anſworth, ſecond premium,		-	3 13 6
Mr. Charles Whitton, third premium,	-	-	3 3 0
Mr. William Gaſtrell, fourth premium,	-	-	2 2 0
Mr. Chriſtopher Finch, fifth premium,	-	-	1 11 6
Mr. Thomas Callard, ſixth premium,	-	-	1 1 0
		Total	15 15 0

Claſs

Claſs 62. *For the beſt Drawings of any Kind, human Figures or Heads excepted, under 14 Years of Age.*

Mr. George Hebert, firſt premium,	-	4	4 0
Mr. Francis Adams, ſecond premium,	-	2	2 0
Mr. George Robinſon, third premium,	-	1	1 0
A further gratuity to Mr. George Robinſon's piece, for extraordinary merit,	-	4	4 0
	Total	11	11 0

Claſs 63. *For Drawing of an Horſe from the Life, under 20 Years of Age.*

April 17, 1760. Mr. William Parr, the only candidate in this claſs,	-	10	10 0
Mr. Iſaac Nerbal, a bounty, for enamel,	-	10	10 0

Landſcapes, under 16 Years of Age.

July 21, 1761. Mr. William Kirby,	-	8	8 0
Mr. Johnſon Carr,	-	5	5 0
Mr. John Hakewell,	-	4	4 0
Mr. Arthur Nelſon,	-	3	3 0
	Total	21	0 0

Mezzotintos, under 21 Years of Age.

Mr. William Pether,	-	6	6 0
Mr. Jonathan Spilſbury,	-	4	4 0
	Total	10	10 0

Etchings

Etchings, under 24 Years of Age.

Mr. Thomas Vivarez, - 3 3 0

Paid Mr. D. Ramier, for his invention of tablets for inſtructing of children to write, a gratuity, - - 5 5 0

Claſs 71. *For Engraving Hiſtory, under 24 Years of Age.*

March 11. Paid Mr. Simon Ravenets, a premium, - 42 0 0

Claſs 72. *For Engraving an human Figure.*

Paid Mr. John Hall, a premium, - - - 21 0 0

Claſs 46. *Drawings of an human Figure, at the Academy in St.* Martin's Lane, *under 24 Years of Age.*

April 15, 1761. Mr. John Mortimer, firſt premium,			14 14 0
Mr. John Taylor, ſecond premium,	-	-	10 10 0
Mr. David Martin, third premium,	-	-	6 6 0
		Total	31 10 0

Claſs 47. *Drawings from Statues in the Duke of* Richmond's *Gallery, under 24 Years of Age..*

Mr. John Greſſe,	-	-	12 12 0
Mr. Richard Earlom,	- -	-	8 8 0
		Total	21 0 0

Claſs 48. *Drawings from Models, &c. under 24 Years of Age.*

Mr. William Parry,	-	-	8 8 0
Mr. William Lawrenſon,	-	-	5 5 0
Mr. John Bellingham,	-	-	2 2 0
		Total	15 15 0

Claſs 49. *Drawings of human Figures, by Youths under 16 Years of Age.*

April 15, 1761. Mr. Thomas Vivarez,	-	5	5 0
Mr. Hugh Barron,	-	3	3 0
Mr. William Willis	-	2	2 0
Mr. Charles Whitton,	-	1	1 0
	Total	11	11

Claſs 51. *Drawings or Compoſitions of Beaſts and Birds, under 16 Years of Age.*

Mr. William Pars,	-	6	6 0

Claſs 52. *For Drawing Flowers, &c. under 16 Years of Age.*

Mr. Simon Taylor,	-	6	6 0
Mr. John Edwards,	-	4	4 0
	Total	10	10 0

Claſs 53. *Drawings of Beaſts, Birds, and Dead Game, under 16 Years of Age.*

Miſs Ann Jones,	-	5	5 0

Claſs 54. *Drawings of Flowers, under 16 Years of Age.*

April 15, 1761. Miſs Mary Vivarez,	-	5	5 0
Miſs Mary Pingo,	-	4	4 0
Miſs Mary Robinſon,	-	1	1 0
	Total	10	10 0

Claſs 56. *Drawings or Compoſitions of Ornaments, by Youths under 20 Years of Age.*

Mr. Henry Pingo	-	-	6 6 0
Mr. Matthias Stable,	-	-	4 4 0
Mr. William Sharp,	-	-	3 3 0
Mr. Robert Chaſſereau,	-	-	2 2 0
		Total	15 15 0

Claſs 58. Mr. Chriſtopher Finch,	-	-	6 6 0
Mr. Robert Dunkarton,	-	-	4 4 0
Mr. Charles Whitton	-	-	3 3 0
Mr. William Gaſtrell,	-	-	2 12 6
Mr. William Burgeſs,	-	-	2 2 0
Mr. James Anſworth,	-	-	1 11 6
Mr. Thomas Turner,	-	-	1 1 0
		Total	21 0 0

Claſs 59. Mr. George Robertſon,	-	-	5 5 0
Mr. Joſeph Colyer,	-	-	3 3 0
Mr. Thomas Grignion,	-	-	2 12 6
Mr. Johnſon Carr,	-	-	2 2 0
Mr. Thomas Cook,	-	-	1 11 6
Mr. Thomas Adams,	-	-	1 1 0
		Total	15 15 0

Claſs 61. Mr. John Kirk,	-	-	17 17 0
Mr. John Pingo,	-	-	15 15 0
		Total	33 12 0

Claſs 62. Mr. Lewis Pingo, for a copper medal, 21 0 0

Claſs 64. *Baſſo Relievos.*

May 6. Mr. John Atkins, - 31 10 0
Mr. Joſeph Nollekens, as a bounty - 10 10 0
Total 42 0 0

Claſs 65. *Models in Clay.*

May 6, 1761. Mr. Nathaniel Smith, - - 15 15 0

Claſs 66. Mr. John Bacon, - - 15 15 0

Claſs 67. Mr. John Walſh, - - 5 5 0

Claſs 68. Mr. John Daintree, - - 9 9 0
Mr. George Parbury, - - 6 6 0
Total 15 15 0

Claſs 69. Mr. Philip Regnart, - - 3 3 0
Mr. John Scott, - - 7 7 0
Total 10 10 0

Claſs 80. *For Hiſtory Painting.*

Chevalier Andrew Caſali, - - 105 0 0

Claſs 82. *For Landſcape Paintings.*

Mr. George Smith, - - 52 10 0

Claſs 83. Mr. John Smith, - - 26 5 0

Claſs 84. *For Drawings in Architecture.*

Mr. Thomas Wiggins, junior,	-	-	21 0 0

Claſs 49. *For Drawings of human Figures or Heads, &c.*

Mr. Edward Robinſon,	-	-	4 4 0
Mr. William Willis,	-	-	2 2 0
		Total	6 6 0

July 15. To Mr. Jeremiah Meyer, for the beſt drawing in Profile, - - 21 0 0

January 20, 1762. *Paid the following Premiums for Drawing Landſcapes, Etchings, Mezzotintos, and Gems.*

Claſs 65. *Landſcapes.*

Mr. Johnſon Carr, firſt premium,	-	-	12 12 0
Mr. William Hodges, ſecond premium,		-	7 7 0
Mr. Arthur Nelſon, third premium,	-	-	5 5 0
Mr. John Hakewell, fourth premium,	-	-	4 4 0
		Total	29 8 0

Etchings.

Mr. Henry Bryer, firſt premium,	-	-	10 10 0
Mr. Thomas Vivarez, ſecond premium,		—	5 5 0
		Total	15 15 0

Mezzotintos.

Mr. Jonathan Spilſbury, firſt premium,		—	15 15 0
Mr. William Pether, ſecond premium,		—	10 10 0
		Total	26 5 0

Gems.

Mr. Nathaniel Merchant, the whole premium,	—	10	10 0
March 3. Paid Mr. Ravenett, a premium, for engraving hiſtory,	-	42	0 0

Claſs 101. *Landſcapes.*

Mr. John Smith,	-	52	10 0
Mr. William Tomkins,	-	26	5 0
	Total	78	15 0

Claſs 107. *Baſſo Relievos in Marble.*

Mr. Joſeph Nollekens,	-	52	10 0
Mr. Daniel Eggert,	-	26	5 0
	Total	78	15 0

Claſs 50. *Drawings at the Academy in St.* Martin's Lane.

June 3, 1762. Mr. John Taylor,	-	8	8 0
Mr. John Mortimer,	-	7	7 0
Mr. Edward Edwards,	-	6	6 0
Mr. William Pars,	-	5	5 0
	Total	27	6 0

Claſs 51. *Drawings from the Duke of* Richmond's *Gallery.*

Mr. Richard Earlom,	-	12	12 0
Mr. John Greſſe,	-	8	8 0
Mr. William Lawranſon,	-	5	5 0
	Total	26	5 0

Class 52. *Drawings of human Figures.*

Mr. William Parry,	-	7	7 0
Mr. John Parker,	-	4	4 0
Mr. William Chinnery,	-	3	3 0
Total		14	14 0

Class 53. *Drawings of human Figures, by Youths under 16 Years of Age.*

Mr. Francis Wheatley,	-	5	5 0
Mr. John Kitchenman,	-	4	4 0
Mr. Thomas Callard,	-	3	3 0
Mr. James Durno	-	2	2 0
Mr. John Henderson,	-	1	1 0
Total		15	15 0

Class 55. *Fruit and Flowers.*

Mr. John Edwards,	-	5	5 0

Class 56. *Birds, Beasts, &c. by Girls under 16 Years of Age.*

Miss Ann Jones, the whole premium,	-	10	10

Class 57. *Fruit, Flowers, and Plants, under 16 Years of Age.*

Miss Mary Pingo,	-	6	6 0
Miss Mary Ann Hamilton,	-	4	4 0
Total		10	10 0

Claſs 58. *Birds, Beaſts, and Flowers, under 20 Years of Age.*

Miſs Mary Fearon,	—	—	3 3 0

Claſs 59 *Ornaments for Weavers, under 20 Years of Age.*

Mr. William Woodward,	-	-	6 6 0
Mr. Matthias Stable,	-	-	4 4 0
Mr. Boyle Arthur,	-	-	3 3 0
Mr. John Taylor,	-	-	2 2 0
		Total	15 15 0

Claſs 60. *Ornaments for Weavers, by Youths under 16 Years of Age.*

Mr. Joſeph Bellingham,	-	-	9 9 0
Mr. Joſeph Bumfries,	-	-	6 6 0
		Total	15 15 0

Claſs 63. *Drawings of any Kind.*

Miſs Alice Morriſon,	-	-	5 5 0

Claſs 64. *Drawings of an Horſe.*

Mr. Chriſtopher Finch,	-	-	5 5 0

Claſs 66. *Drawings in Architecture.*

Mr. Edward Stevens,	-	-	18 18 0
Mr. James Gandon,	-	-	12 12 0
		Total	31 10 0

Claſs

Claſs 68. *Copper Medals.*

Mr. John Kirk,	-	-	31 10 0

Claſs 69. Mr. John Pingo, - - 21 0 0

Claſs 70. Mr. Lewis Pingo, - - 21 0 0

Claſs 72. *Baſſo Relievos in Portland Stone.*

Mr. John Eckſteine,	-	-	15 15 0

Claſs 74. *Baſſo Relievos in Clay.*

Mr. Nathaniel Smith, the whole premium,		-	21 0 0
Mr. William Mitchel,	-	-	10 10 0
		Total	31 10 0

Claſs 78. *Compoſitions in Clay.*

Mr. John Scott,	-	-	8 8 0
Mr. George George,	-	-	4 4 0
Mr. John Barnard,	-	-	3 3 0
		Total	15 15 0

Claſs 79. *Models of Ornaments in Clay.*

Mr. John Cuenot,	-	-	7 7 0
Mr. John Carter,	-	-	2 2 0
Mr. Thomas Earley,	-	-	1 1 0
		Total	10 10 0

Claſs 81. *Model in Wax.*

June 3, 1762. Mr. Joſeph Moſer, - 7 7 0

Claſs 80. *For an Hiſtorical Picture.*

June 16. Chevalier Andrew Caſali, firſt premium, - 105 0 0

Claſs 103. *Marble Statues.*

Mr. Nicholas Read, firſt premium, - 105 0 0
Mr. Samuel Harvey, ſecond premium, - 52 10 0
Total 157 10 0

Claſs 101. *For Landſcape Painting.*

July 1. Paid Mr. John Smith, firſt premium, - 52 10 0

Claſs 107. *Baſſo Relievos in Marble.*

Mr. Joſeph Nollekens, - 52 10 0
Mr. Daniel Eggert, ſecond premium in Claſs 108. - 26 5 0
Total 78 15 0

Claſs 102. *For Landſcape Painting.*

Paid Mr. William Tomkins, ſecond premium, - 26 5 0

July 26, 1762. Claſs 61. Mr. David Sands, - 4 4 0
Mr. William Penny, - 1 11 6
Total 5 15 6

Clafs 75. Mr. William Mitchell, - - 10 10 0

Clafs 62. Mr. Robert Dunkarton, - - 2 12 6
Mr. Ralph Wewitzer, - - 2 2 0
Mr. Thomas Brooks, - - 1 1 0
Total 5 15 0

September, 29, 1763. Clafs 54. Mr. John Parker, 10 10 0

Clafs 163. *Mezzotintos.*

Feb. 4. Mr. Jonathan Spilfbury, - 15 15 0

Clafs 173. *Cameos.*

Mr. Edward Burch, - - 21 0 0

Clafs 174. Mr. Nehemiah Spicer, - - 5 5 0

Clafs 175. *Intaglio.*

Mr. Nathaniel Marchant, - - 10 10 0

Clafs 176. *Intaglio.*

Mr. John Trewin, - - 21 0 0

Clafs 178. *Paftes.*

Mr. Samuel More - - 21 0 0

Clafs 157. *Models in Wax, by Girls.*

April 1. Miſs Mary Robinſon, ſecond premium, - 3 3 0

Claſs 110. *Drawings at the Academy in St.* Martin's Lane.

Mr. Richard Earlom,	9	9	0
Mr. William Pennington,	3	3	0
Total	12	12	0

Claſs 142. *Medallions.*

Mr. John Taylor,	10	10	0

Claſs 152. *Model in Clay.*

Mr. John Carter,	15	15	0

Claſs 154. *For Models of Ornaments in Clay, by Youths under 22 Years of Age.*

Mr. George George,	7	7	0
Mr. John Scott,	5	5	0
Mr. Philip Regnart,	3	3	0
Total	15	15	0

Claſs 155. Mr. John Cuenot,	7	7	0
Mr. Lewis Robinſon,	2	2	0
Mr. Henry Druit,	1	1	0
Total	10	10	0

Claſs 156. *Models in Wax.*

Mr. Joſeph Moſer,	12	12	0

Claſs

Claſs 157. *Models in Wax, by Girls.*

Miſs Mary Ann Hamilton, firſt premium,	-	5	5 0
Miſs Mary Robinſon, ſecond premium,	-	3	3 0
	Total	8	8 0

Claſs 169. *Engravings of human Figures.*

Mr. Henry Bryer,	-	21	0 0

Claſs 111. *Drawings in the Duke of* Richmond's *Gallery.*

Mr. William Parry, firſt premium,	-	10	10 0
Mr. William Lawranſon, ſecond premium,	-	7	7 0
	Total	17	17 0

Claſs 114. *Beaſts, Birds, &c.*

April 15, 1763. Mr. John Parker, firſt premium,		5	5 0
Mr. John Hakewell, ſecond premium,	-	4	4 0
	Total	9	9 0

Claſs 116. *Flowers, Fruit, &c.*

Mr. John Edwards,	-	7	7 0
Mr. John Kitchenman,	-	2	2 0
Mr. Thomas Hearn,	-	1	1 0
	Total	10	10 0

Claſs

Claſs 119. *Ornaments for Weavers, under 20 Years of Age.*

Mr. William Woodward,	-	11	11 0
Mr. Francis Torrand,	-	6	6 0
Mr. Joſeph Bumfries,	-	3	3 0
Mr. William Sharp,	-	2	2 0
	Total	23	2 0

Claſs 120. *Ornaments for Weavers, by Youths under 16 Years of Age.*

Mr. Samuel Paris,	-	6	6 0
Mr. John Brown,	-	4	4 0
Mr. Thomas Brooks,	-	3	3 0
	Total	13	13 0

Claſs 121. *Human Figures, by Youths under 14 Years of Age.*

Mr. David Sandys,	-	5	5 0
Mr. Chriſtopher Towers,	-	4	4 0
Mr. William Mondett,	-	3	13 6
Mr. Robert Steel,	-	3	3 0
Mr. John Milbourn,	-	1	11 6
Mr. Richard Hurlſtone	-	1	1 0
	Total	18	18 0

Claſs 122. *Drawings of any Kind, under 14 Years of Age.*

Mr. Andrew Thornthwaite,	-	5	5 0
Mr. Moſes Blanchard,	-	3	3 0
Mr. Ralph Wewitzer,	-	1	1 0
	Total	9	9 0

Claſs 138. *Architecture.*

Mr. Edward Stevens,	-	-	21 0 0
Mr. Thomas Cooley,	-	-	10 10 0
Mr. James Gandon,	-	-	5 5 0
		Total	36 15 0

Claſs 147. *Baſſo Relievos in Clay.*

April 15, 1763.	Mr. John Bacon,	- -	10 10 0

Claſs 181. *Hiſtory Painting.*

Mr. Robert Edge Pine, firſt premium,		-	105 0 0
Mr. John Mortimer, ſecond premium,		-	52 10 0
Mr. George Rumney, a bounty,	-	-	26 5 0
		Total	183 15 0

Claſs 117. *Drawings of Fruit, &c. by Girls under 20 Years of Age.*

April 22.	Miſs Ann Jones,	- -	5 5 0

Claſs 118. *Drawings of Ornaments, by Girls under 18 Years of Age.*

Miſs Mary Fearon,	-	-	5 5 0
Miſs Alice Morriſon,	-	-	3 3 0
		Total	8 8 0

Claſs

Claſs 123. *Drawings of any Kind, by Girls under 15 Years of Age.*

Miſs Elizabeth Graham,	-	4	4 0
Miſs Penelope Graham,	-	1	11 6
	Total	5	15 6

Claſs 150. *Baſſo Relievo in Portland Stone.*

Mr. Thomas Banks,	-	31	10 0

Claſs 183. *Landſcape Painting.*

Mr. George Smith,	-	52	10 0

Claſs 184.	Mr. Charles Stuart,	-	26	5 0
Claſs 185.	Mr. Anthony Davis,	-	10	10 0

Claſs 141. *Drawings in Architecture.*

May 20. Mr. John Plaw,	-	21	0 0

Claſs 112. *Drawings of human Figures, from Models, Caſts, &c.*

May 25. Mr. John Bellingham,	-	6	6 0
Mr. William Pennington,	-	5	5 0
Mr. John Terry,	-	4	4 0
Mr. John Parker,	-	3	3 0
Mr. Simon Watts,	-	2	2 0
	Total	21	0 0

Claſs

Claſs 113. *Drawings of an human Figure, after a Print or Drawing.*

Mr. Francis Wheatley,	-	7	7 0
Mr. William Gaſtrell,	-	5	5 0
Mr. Robert Dunkarton	-	3	3 0
Mr. Philip Wickſtead,	-	2	2 0
	Total	17	17 0

Claſs 128. *Drawings of Landſcapes after Nature.*

Mr. Johnſon Carr,	-	15	15 0
Mr. Thomas Vivarez,	-	9	9 0
Mr. William Hodges,	-	6	6 0
	Total	31	10 0

Claſs 160. *Etchings.*

Mr. Thomas Bonner,	-	10	10 0
Mr. James Record,	-	7	7 0
	Total	17	17 0

Claſs 161. Miſs Mary Vivarez, the whole premium, 10 10 0

Claſs 179. *Caſting in Bronze.*

June 29. Mr. Nicholas Anderſon, - - 42 0 0

Mr. Samuel Harvey, for a marble ſtatue, - - 73 0 0

Claſs 127. *For Drawings of an human Figure or Figures from Models.*

January 27, 1764.	Mr. William Pennington, -	8	
Mr. Philip Wickſtead,	- -	7	7 0
Mr. Johnſon Carr,	- -	3	3 0
Mr. John Kitchenman,	-	2	2 0
	Total	21	0 0

Claſs 128. *For Drawings of a ſingle human Figure.*

Mr. William Lewen,	- -	5	5 0
Mr. Thomas Brooks,	- -	4	4 0
Mr. Studman Blake,	- -	1	1 0
Mr. Richard Sparrow,	-	1	1 0
	Total	11	11 0

Claſs 129. *For three or more human Figures.*

Mr. George Sykes,	- -	7	7 0
Mr. David Sands,	-	5	5 0
Mr. Robert Dunkarton,	-	3	3 0
	Total	15	15 0

Claſs 144. *Drawings of Landſcapes after Nature.*

Mr. William Hodges,	- -	15	15 0
Mr. Joſeph Farrington,	- -	9	9 0
Mr. John Fougeron,	-	6	6 0
	Total	31	10 0

Claſs

Claſs 179. *For Engravings in Wood.*

Mr. Simon Watts,	-	-	15 15 0
Mr. James Deacon,	-	-	10 10 0
		Total	26 5 0

Claſs 181. *For Etchings.*

January 27, 1764.	Mr. James Record,	-	8 8 0
Mr. Francis Torond,	-	-	5 5 0
Mr. Renne Rogers,		-	4 4 0
Mr. William Humphrey,	-	-	3 3 0
		Total	21 0 0

Claſs 187. *For Engraving Landſcapes.*

Mr. Thomas Vivarez,	-	-	26 5 0

Claſs 201. *For Cameo.*

Mr. Robert Staples,	-	-	5 5 0

Claſs 205. *For Intaglio.*

Mr. Lewis Pingo,	-	-	21 0 0

Claſs 207. *For Paſtes.*

Mr. Samuel More,	-	-	21 0 0

Claſs 213. *For Enamels.*

March 23.	Mr. John Finlayſon,	-	15 15 0
Mr. Charles Handaſyde,		-	10 10 0
		Total	26 5 0

Claſs 199. *For Cameos.*

Mr. Edward Burch,	-	-	10 10 0
Mr. Nehemiah Spicer	-	-	5 5 0
		Total	15 15 0

Claſs 193. *For Engraving Hiſtory.*

April 6.	Mr. Henry Bryer,	-	21 0 0

Claſs 211. *Chiaro Oſcuros.*

April 24.	Mr. Hugh Douglas Hamilton, firſt premium,		18 18 0
	Mr. Edward Edwards, ſecond premium,	- -	7 7 0
		Total	26 5 0

Claſs 215. *Painting Sea Pieces.*

Mr. Richard Wright,	-	-	31 10 0
Mr. Francis Swain,	-	-	15 15 0
		Total	47 5 0

Claſs 217. *Hiſtory Paintings.*

Mr. John Mortimer, firſt premium,	-	-	105 0 0
Mr. Maſon Chamberlain, part of the ſecond premium,			26 5 0
Mr. William Pars, the other part of the ſecond premium,			21 0 0
		Total	152 5 0

Claſs 219. *Landſcape Paintings.*

Mr. George Barrett,	-	-	52 10 0
Mr. Daniel Bond,	-	-	26 5 0
Mr. Charles Stuart,	-	-	10 10 0
			89 5 0

Claſs 222. *For a Marble Statue.*

April 27.	Mr. Nicholas Read,	-	-	147 10 0

Claſs 226. *For Baſſo Relievos in Marble.*

Mr. John Eckſtein, firſt premium,	-	-	52 10 0
Mr. Lloyd Anderſon Holm,	-	-	26 5 0
		Total	78 15 0

Claſs 126. *Drawings from the Duke of* Richmond's *Gallery.*

May 11, 1764.	Mr. William Pennington,	-	8 8 0
	Mr. John Hakewell,	-	6 6 0
	Mr. Hugh Baron,	-	4 4 0
		Total	18 18 0

Claſs

Claſs 130. *Drawings of human Figures or Heads, after Drawings or Prints.*

May 11, 1764.	Mr. Robert Steel,	5	5	0
	Mr. William Mondet,	4	4	0
	Mr. Robert Hardy,	3	3	0
	Mr. Philip Stevenart,	2	2	0
	Mr. Richard Hurlſtone,	1	1	0
	Mr. John Milbourn,	1	1	0
	Total	16	16	0

Claſs 138. *Drawings of Ornaments, by Youths under 20 Years of Age.*

May 27.	Mr. William Woodward,	7	7	0
	Mr. Samuel Paris,	4	4	0
	Total	11	11	0

Claſs 141. *Drawings of any Kind, by Boys under 14 Years of Age.*

	Mr. Andrew Thornthwaite,	5	5	0
	Mr. John Alexander,	4	4	0
	Mr. James Jones,	3	3	0
	Total	12	12	0

Claſs 143. *Drawings of an Horſe from Life, by Youths under 20 Years of Age.*

	Mr. Thomas Hearn,	8	8	0
	Mr. Chriſtopher Finch,	7	7	0
	Total	15	15	0

Class 157. *Designs in Architecture.*

Mr. James Gandon,		31	0 0
Mr. Thomas Cooley,		21	0 0
Mr. Robert Baldwin,		10	10 0
	Total	62	10 0

Class 160. *Drawings in Architecture.*

Mr. James Pollard,		10	10 0
Mr. Richard Edwin,		7	7 0
Mr. Thomas Sutton,		3	3 0
	Total	21	0 0

Class 161. *Historical Drawings.*

Mr. John Donaldson,		21	0 0
Mr. John Edwards,		5	5 0
	Total	26	5 0

Class 163. *Medallion.*

May 25, 1766. Mr. John Taylor,		10	10 0

Class 168. *Basso Relievos in Clay.*

Mr. John Bacon,		15	15 0
Mr. John Daintree,		5	5 0
	Total	21	0 0

Class

Claſs 173. *Models in Clay.*

Mr. Thomas Earlom,	-	5	5 0

Claſs 175. *Models of Ornaments in Clay.*

Mr. George George,	-	6	6 0
Mr. John Scott,	-	4	4 0
Mr. Richard Haſlewood,	-	3	3 0
Mr. Philip Regnart,	-	2	2 0
	Total	15	15 0

Claſs 176. *Models of Ornaments in Clay.*

Mr. George Reynolds,	-	4	4 0
Mr. Charles Banks,	-	3	3 0
Mr. John Gilbert, jun.	-	2	2 0
Mr. Lewis Robinſon,	-	1	1 0
	Total	10	10 0

Claſs 177. *For the beſt Model in Wax.*

Mr. Albertes Pars,	-	10	10 0

Claſs

Claſs 125. *Drawings at the Academy in St.* Martin's Lane.

June 1, 1764. Mr. William Parry,	-	8	8 0
Mr. William Lawrenſon,	-	7	7 0
Mr. Johnſon Carr,	-	6	6 0
Mr. Richard Earlom,	-	5	5 0
Mr. Thomas Jones,	-	3	3 0
Mr. Matthew Liart,	-	1	1 0
	Total	31	10 0

Claſs 134. *Drawings of Fruit, &c. by Girls under* 20 *Years of Age.*

Miſs Ann Jones,	-	3	3 0
Miſs Mary Brooke,	-	2	2 0
Miſs Mary Chambers,	-	1	1 0
	Total	6	6 0

Claſs 135. *Drawings of Ornaments, by Girls under* 20 *Years of Age.*

Miſs Mary Fearon,	-	3	3 0
Miſs Ann Sherbon,	-	2	2 0
		5	5 0

Claſs 136. *Drawings for Weavers, by Girls under* 18 *Years of Age.*

Miſs Alice Morriſon,	-	6	6 0

Class 137. *Drawings or Compositions of Ornaments.*

Mr. John Bellingham,	-	-	10 10 0
Mr. William Sharp,	-	-	6 6 0
Mr. John Millar,	-	-	4 4 0
		Total	21 0 0

Class 142. *Drawings of any Kind, by Girls under 15 Years of Age.*

Miss Elizabeth Sophia Tuckwell,	-	-	5 5 0
Miss Mary Bruce Strange,	-	-	4 4 0
Miss Elizabeth Graham,	-	-	3 3 0
Miss Ann Pars,	-	-	2 2 0
Miss Penelope Graham,	-	-	1 1 0
		Total	15 15 0

Class 178. *Models of Ornaments in Wax, by Girls under 21 Years of Age.*

Miss Mary Robinson,	-	-	6 6 0

Class 189, 190. *Engravings of History Pieces.*

Mr. Simon Francis Ravenet,	-	-	42 0 0
Mr. Francis Aliamet,	-	-	26 5 0
		Total	68 5 0

Mr. James Keys, for fixing of Crayons,	-	31	0 0

Claſs 116. *Drawings at the Academy.*

Mr. William Lawrenſon,	-	10	10 0
Mr. William Parry,	-	6	6 0
Mr. Thomas Jones,	-	4	4 0
Mr. Matthew Liart,	-	3	3 0
Total		24	3 0

Claſs 117. *Drawings from the Duke of Richmond's Gallery.*

Mr. William Pennington,	-	5	5 0
Mr. James Durno,	-	4	4 0
Mr. John Terry,	-	3	3 0
Total		12	12 0

Claſs 118. *Drawings of an human Figure, from Models, Caſts, &c.*

Mr. John Kitchenman,	-	6	6 0
Mr. Hugh Barron,	-	4	4 0
Mr. Philip Wickſtead,	-	2	2 0
Total		12	12 0

Claſs 119. *Drawings of an human Figure after a Print.*

Mr. John Milbourne,	-	5	5 0
Mr. John Beauvis,	-	3	3 0
Mr. Chriſtopher Tower,	-	2	2 0
Mr. David Hennell,	-	1	1 0
Total		11	11 0

Claſs 120. *Drawings of human Figures in Groups.*

Mr. Thomas Brooks,		5	5 0
Mr. William Rogers,		3	3 0
	Total	88	0

Claſs 121. *Drawings of human Figures or Heads, after Prints, &c.*

Mr. Andrew Vanrymſdyke,		8	8 0
Mr. Robert Morris,		5	5 0
Mr. Robert Montreavor,		4	4 0
Mr. John Wilmott,		3	3 0
	Total	21	0 0

Claſs 133. *Drawings of a Horſe from Life.*

Mr. Joſeph Farrington,		10	10 0
Mr. John Fougeron,		6	6 0
Mr. John Frederick Miller,		4	4 0
	Total	21	0 0

Claſs 170. *Etchings from Prints.*

Mr. Henry Crane Green,		7	7 0
Mr. Thomas Hearne,		5	5 0
Mr. Barnabas Mayor,		3	3 0
Mr. Knavenhuller Skinner,		1	1 0
	Total	16	16 0

Class 172. *For scraping in Mezzotinto of a Portrait from any Picture of which there are no Prints.*

Mr. William Humphryes, first premium,	-	10	10 0
Mr. Samuel Okey, jun. second premium,		8	8 0
	Total	18	18 0

Class 176. *Engravings of Landscapes with Figures.*

Mr. William Byrne,	-	26	5 0
Mr. Thomas Vivarez,	-	15	15 0
	Total	42	0 0

Class 188. *Cameo Figure engraved on an Onyx, Representing the the Head of Antinous.*

Mr. Lewis Pingo,	-	10	10 0
Mr. Nehemiah Spicer,	-	5	5 0
	Total	15	15 0

Class 190. *Heads in Cameo, engraved on an Onyx, Representing the Head of Antinous.*

Mr. Robert Staples,	-	10	10 0

Class 192. *Heads in Intaglio, engraved on a Carnelian, Representing the Head of Ganymede.*

Mr. John Frewin,	-	10	10 0

Class 194. *Figures in Intaglio, engraved on an Oval red Carnelian, Representing the Dancing Fawn.*

Mr. Nathaniel Marchant,	-	21	0 0

Class 196. *Pastes.*

Mr. Edward Carter,	-	10 10 0
Mr. Richard Frewin,	-	5 5 0
	Total	15 15 0

Class 122. *Drawings of Birds, Beasts, &c.*

Mr. Robert Dunkarton,	-	4 4 0
Mr. James Lee,	-	2 2 0
	Total	6 6 0

Class 124. *For the best Drawings or Compositions, being Originals of Fruit, Flowers, &c. under 20 Years of Age.*

Mr. Pierre Nicholas Petheu,	-	10 10 0

Class 126. *Drawings or Compositions of Ornaments, by Girls under 18 Years of Age.*

Miss Jane Braim, first premium,	-	5 5 0
Miss Nancy Wilton, second premium,	-	4 4 0
Miss Ann Sherborn, third premium,	-	1 1 0
	Total	10 10 0

Class 127. *Drawings for Weavers, &c.*

Miss Alice Morrison,	-	7 7 0

Class 128. *For the best Drawings or Compositions, being Original Designs, fit for the Use of Embroiders, &c. by Youths under 20 Years of Age.*

Mr. William Lewin,	-	-	8 8 0
Mr. Hugh Clarke,	-	-	6 6 0
		Total	14 14 0

Class 129. *For the best Drawings or Compositions, being Original Designs fit for the Use of Weavers, by Youths under 20 Years of Age.*

Mr. William Woodward,	-	-	4 4 0
Mr. Benjamin Pingo,	-	-	3 3 0
		Total	7 7 0

Class 130. *For the best Drawings of any Kind (human Figures and Heads excepted) by Boys under 14 Years of Age.*

Mr. Richard Oakes,	-	-	5 5 0
Mr. Charles Gregnion,	-	-	3 3 0
Mr. John Wakelin,	-	-	2 2 0
Mr. John Atkinson,	-	-	1 1 0
		Total	11 11 0

Class

Claſs 131. *Drawings of any Kinds, by Girls under 15 Years of Age.*

Miſs Frances Dixon,	-	6	6 0
Miſs Mary Bruce Strange,	-	5	5 0
Miſs Elizabeth Sophia Tuckwell,	-	4	4 0
Miſs Ann Parrs,	-	3	3 0
Miſs Sophia Burnett,	-	2	2 0
	Total	21	0 0

Claſs 203. *Original Hiſtorical Paintings in Enamel.*

Mr. John Donaldſon,	-	21	0 0
Mr. Charles Handaſyde,	-	15	15 0
	Total	36	15 0

Claſs 146, 147, 148. *The beſt Deſign of the Side of a Street.*

Mr. George Richardſon,	-	21	0 0
Mr. Thomas Cooley,	-	15	15 0
Mr. Robert Baldwin,	-	10	10 0
	Total	47	5 0

Claſs

Claſs 149. *For the beſt Drawings of the Portico of* St. George's *Church,* Hanover *Square.*

Mr. James Pollard, firſt premium,	-	-	4 4 0
Mr. Andrew Thornthwaite, ſecond premium,		-	3 3 0
		Total	7 7 0

Claſs 155. *For the beſt Copper Medal.*

Mr. John Pingo,	-	-	31 10 0

Claſs 159. *For the beſt Baſſo Relievo in Clay.*

Mr. John Bacon,	-	-	21 0 0
Mr. Thomas Sheemaker,	-	-	10 10 0
Mr. John Carter,	-	-	5 5 0
		Total	36 15 0

Claſs 164. *For the beſt Models in Clay.*

Mr. Charles Banks,	-	-	15 15 0

Claſs 166. *For the beſt Original Compoſitions, conſiſting of Birds, &c. by Youths under* 20 *Years of Age.*

Mr. Joſeph Roſe,	-	-	10 10 0
Mr. John Scott,	-	-	3 3 0
Mr. Philip Regnart,	-	-	2 2 0
		Total	15 15 0

Claſs 167. *For the beſt Models of Ornaments in Clay, conſiſting of Birds, Beaſts, &c. by Youths under 19 Years of Age.*

Mr. George Reynolds,	-	-	5 5 0

Claſs 168. *For the beſt Models in Wax of Figures and Beaſts, by Youths under 21 Years of Age.*

Mr. Albertus Pars,	-	-	8 8 0
Mr. Joſeph Moſer,	-	-	4 4 0
Mr. Richard Banſom,	-	-	3 3 0
		Total	15 15 0

Claſs 178. *For the beſt Engravings of Hiſtory Pieces.*

Mr. Thomas Chambers,	-	-	42 0 0
Mr. Francis Aliamet,	-	-	26 5 0
		Total	68 5 0

Claſs 198. *For Caſting in Bronze.*

Mr. Charles Frederick Maximilian Mellian,		-	21 0 0

Claſs 200. *For the beſt Original Hiſtorical Picture in Claro Obſcuro.*

Mr. Edward Edwards,	-	-	15 15 0

Claſs 204, 205, 206. *For the beſt Original Sea Piece.*

Mr. Robert Wilkins,	-	-	31 10 0
Mr. Francis Swaine,	-	-	21 0 0
Mr. John Cleveley,	-	-	10 10 0
		Total	63 0 0

Claſs 207, 208. *For the beſt Original Hiſtorical Pictures.*

Mr. Hugh Hamilton,	-	-	63 0 0
Mr. George Romney,	-	-	52 10 0
		Total	115 10 0

Claſs 209, 210, 211. *For the beſt Original Landſcapes.*

Mr. Daniel Bond,	-	-	52 10 0
Mr. Herbert Pugh,	-	-	26 5 0
Mr. Hugh Primroſe Dean,	-	-	10 10 0
		Total	89 5 0

Claſs 150. *For the beſt Hiſtorical Drawing, under 25 Years of Age.*

Mr. Richard Earlom,	-	-	15 15 0

Claſs

Claſs 212, 213. *For the beſt Original Statue of a naked Figure as large as the Life, in white Marble.*

Mr. Laurits Anderſon Holm,	-	-	147 0 0
Mr. Samuel Harvey,	-	-	84 0 0
		Total	231 0 0

Claſs 216, 217. *For the beſt Baſſo Relievo, wrought in white Marble.*

Mr. John Fardinan Vander Mulin, firſt premium,			52 10 0
Mr. Thomas Banks, ſecond premium,		-	26 5 0
		Total	78 15 0

Bounties given for Caſting in Bronze.

Mr. John Hazell,	-	-	26 5 0
Mr. I. S. Manley,	-	-	15 15 0
		Total	42 0 0

Gave a Gratuity for a Survey of the County of Devon.

Mr. Benjamin Down,	-	-	100 0 0

Claſs 121. *Drawings of human Figures, from Models, Caſts, &c. by Youths under* 20 *Years of Age.*

Mr. John Kitchenman,	-	-	8 8 0
Mr. James Durno,	-	-	4 4 0
Mr. Hugh Baron,	-	-	3 3 0
		Total	15 15 0

Claſs 138. *Drawings of Landſcapes after Nature, by Youths under 19 Years of Age.*

Mr. Joſeph Farrington, firſt premium,	-	15	15 0
Mr. Francis Wheatley, ſecond premium,	-	5	5 0
	Total	21	0 0

Claſs 167. *For the beſt Scraping in Mezzotinto, by young Women, under 25 Years of Age.*

Miſs Mary Vivarez,	- -	6	6 0

Claſs 179. *For the beſt Intaglio, engraved on a Carnelian.*

Mr. Edward Burch,	- -	10	10 0

Claſs 166. *For the beſt Scraping in Mezzotinto, by young Men under 25 Years of Age.*

Mr. William Humphreys,	- -	15	15 0

Claſs 128. *Drawings of a human Figure in Groups, by Youths under 16 Years of Age.*

Mr. Thomas Rider,	- -	6	6 0
Mr. Richard Atkinſon,	- -	4	4 0
	Total	10	10 0

Claſs 122. *Drawings of a human Figure after a Print or Drawing, by Youths under 16 Years of Age.*

Mr. James Roberts,	- -	3	3 0
Mr. Richard Oakes,	- -	2	2 0
	Total	5	5 0

Claſs 124. *Drawings of human Figures or Heads, after Drawings or Prints, by Boys under 14 Years of Age.*

Mr. Andrew Van Rymodyke,	-	-	10 10 0
Mr. William Auguſtus Barron,	-	-	6 6 0
Mr. James Rouby,	-	-	4 4 0
		Total	21 0 0

Claſs 162. *For the beſt Etching Copy from any Print, not leſs than nine Inches by ſix, by Youths under 21 Years of Age.*

Mr. Robert Stubbs,	-	-	10 10 0

Claſs 127. *Drawings of Fruits, Flowers, &c.*

Mr. Robert Dunkarton,	-	-	6 6 0
Mr. James Paul Atkinſon,	-	-	4 4 0
		Total	10 10 0

Claſs 128. *Drawings of Fruit, Flowers, &c. by Girls.*

Miſs Jane Braime, the only premium,	-	-	4 4 0

Claſs 135. *Drawings of any Kind, by Boys.*

Mr. Francis White,	-	-	4 4 0
Mr. Charles Ruben Riley,	-	-	3 13 6
Mr. William Price,	-	-	3 3 0
Mr. Auguſtus Touſaint,	-	-	1 11 6
Mr. Joſiah Smith,	-	-	1 1 0
		Total	13 13 0

Claſs 137. *Drawing of a Horſe.*

Mr. John Paris,	-	-	1 1 0

Claſs 164. *Etchings of Hiſtory Pieces.*

Mr. Richard Earlom,	-	-	21 0 0
Mr. Thomas Vivarez,	-	-	5 5 0
		Total	26 5 0

Claſs 167. Miſs Mary Vivarez, - - 6 6 0

Claſs 128. *Drawings of Fruit, Flowers, &c. by Girls.*

Miſs Jane Braime, the only premium, - - 4 4 0

Claſs 135. *Drawings of any Kind by Boys.*

Mr. Francis White,	-	-	4 4 0
Mr. Charles Ruben Riley,	-	-	3 13 0
Mr. William Price,		-	3 3 0
Mr. Auguſtin Touſaint,	-	-	1 11 0
Mr. Joſiah Smith,	-	-	1 1 0
		Total	13 13 0

Claſs 137. *Drawings of a Horſe.*

Mr. John Paris, - - 1 1 0

Claſs 164. *Etchings of Hiſtory Pieces.*

Mr. Richard Earlom,	-	-	21 0 0
Mr. Thomas Vivarez,	-	-	5 5 0
		Total	26 5 0

Claſs 167. Miſs Mary Vivarez, - - 6 6 0

Claſs 179. Mr. Edward Burch, - - 10 10 0

Claſs 181. Mr. Nathaniel Marchant, - - 15 15 0

Claſs 131. Mr. John Beſt, - - 4 4 0

Claſs 129. *Drawings of Ornaments, by Girls under 20 Years of Age.*

Miſs Ann Pars, - - 3 3 0

Claſs 132. *Drawings of Ornaments for the Uſe of Weavers.*

Mr. Samuel Paris, firſt premium, - - 14 14 0
Mr. Benjamin Pingo, ſecond premium, - 6 6 0
Total 21 0 0

Claſs 136. *Drawings of any Kind, by Girls.*

Miſs Frances Dickſon, firſt premium, - - 8 8 0
Miſs Alice Williams, ſecond premium, - - 6 6 0
Miſs Iſabella Blackburne, third premium, - 3 3 0
Miſs Sophia Burnet, fourth premium, - - 2 2 0
Miſs Martha Iſaacs, - - 1 1 0
Total 21 0 0

Claſs 119. *Drawings at the Academy in St.* Martin's Lane.

Mr. William Lawrenſon, firſt premium, - - 5 5 0
Mr. John Berridge, ſecond premium, - - 4 4 0
Total 9 9 0

Claſs 151. *Hiſtorical Drawings.*

Mr. William Parry, - - 15 15 0

Claſs 170. *For Engravings of Hiſtory Pieces.*

Mr. Thomas Chambers, firſt premium,	-	42	0 0
Mr. John Millar, ſecond premium, -	-	26	5 0
	Total	68	5 0

Claſs 172. *Drawings of an human Figure.*

Mr. Matthew Liart,	- -	21	0 0

Claſs 157. *For the beſt Baſſo Relievo in* Portland *Stone.*

Mr. James Calvert,	- -	15	15 0

Claſs 183. *For Caſting in Bronze.*

Mr. John Hazel,	- -	21	0 0

Claſs 185. *Chiaro Oſcuro.*

Chevalier Andrew Caſali,	- -	52	10 0
Mr. Peter Falconet,	- -	26	5 0
	Total	78	15 0

Claſs 189, 190, 191. *Sea Pieces.*

Mr. Richard Wright, firſt premium,	- -	52	10 0
Mr. Thomas Mitchell, ſecond premium,	-	26	5 0
Mr. Robert Wilkins, third premium,	-	10	10 0
	Total	89	5 0

Claſs 196. *For Baſſo Relievos in white Marble.*

Mr. Thomas Sheemaker,	- -	52	10 0
Mr. Thomas Banks,	-	10	10 0
	Total	63	0 0

Claſs 103. *For drawing of a Landſcape.*

Mr. Thomas Hearn,	-	-	6 6 0

Claſs 122. *For an Etching.*

Miſs Mary Vivarez,	-	-	10 10 0

Claſs 123. *For Mezzotintos.*

Mr. Robert Dunkarton,	-	-	12 12 0
Mr. William Dickenſon,	-	-	8 8 0
Mr. Samuel Okey, jun.	-	-	5 5 0
		Total	26 5 0

Claſs 116. *For Baſſo Relievo in Clay.*

Mr. Charles Brooks,	-	-	21 0 0

Claſs 127. *For Caſting in Bronze.*

Mr. Albertus Pars,	-	-	10 10 0

Claſs 102. *Patterns for Weavers.*

Mr. John Edwards, part of the premium,			12 12 0

Claſs 128. *Landſcapes.*

Mr. Thomas Jones,	-	-	31 10 0
Mr. John Gardner,	-	-	26 5 0
		Total	57 15 0

Claſs

Claſs 93. *Drawings at the Academy in St.* Martin's Lane.

Mr. Philip Renigal, - - 4 4 0

Claſs 131. *Baſſo Relievos in Marble.*

Mr. John Ferdinand Vander Mulin, firſt premium, 31 10 0
Mr. Theodore Ballant, ſecond premium, - 26 5 0

Total 57 15 0

Claſs 124. *Marble Statues.*

Mr. Lawrance P. Holmes, - - 42 0 0

Mr. James Taſſie, a bounty for Portraits in Paſte, 10 10 0

Mr. Burdett, a gratuity for a Survey of the County of Derby, - - - 100 0 0

Claſs 102. *For Patterns for Weavers.*

Mr. William Nailor, part of a premium, - 6 6 0

Claſs 115. *Hiſtory Painting.*

Mr. Peter Falconet, ſecond premium, firſt not given, 26 5 0

Claſs

Claſs 111, 112. *Landſcape Paintings.*

Mr. Nicholas Thomas Dall, firſt premium, -	31	10 0
Mr. Thomas Jones, ſecond premium, - -	26	5 0
Total	57	15 0

Claſs 106. *Baſſo Relievo in Clay.*

Mr. John Flexman, jun. - -	10	10 0

Claſs 102. *Patterns for Weavers.*

Mr. John Tuvin, part of the premium, - -	10	10 0

Claſs 113. *Sea Pieces.*

Mr. Richard Wright, - -	52	10 0

Claſs 114. *Painting in Enamel.*

Mr. John Donaldſon, - -	31	10 0
Madame Fleury Deremunt, for artificial flowers, -	3	3 0

Claſs 92. *For Drawings of Ornamental Furniture.*

Mr. Thomas Banks, - -	21	0 0

Claſs

Claſs 86. *For Intaglio.*

Mr. Robert Staples, - - 5 5 0

Miſs Ann Hewit, a bounty, for drawings and plates, 10 10 0

Miſs Mary Braddock, a bounty, for artificial flowers made of ſtraw, - - - 5 5 0

Claſs 113. *Landſcape Painting.*

Mr. John Alexander Greſſe, - - 10 10 0

Claſs 112. Mr. Edmund Garvey, part of the firſt premium, 21 0 0

Claſs 116. *Hiſtory Painting.*

Mr. Hugh Douglas Hamilton, part of the firſt premium, 15 15 0

For a Model in Clay of Promotheus, *as large as Life.*

Mr. Thomas Banks, - - 21 0 0

Captain Armſtrong, a bounty, for the map of Northumberland, - - 52 10 0

Claſs 135. *For Drawings after Life.*

Mr. Edward Edwards, a bounty, - - 6 6 0

Miſs. Mary Elizabeth Jones, a bounty for a baſket of artificial flowers, - - - 2 2 0

Claſs 146. *For Hiſtory Painting.*

Mr. James Durno, - - 31 10

Claſs 142. Mr. James Lambart, part of the premium, 15 10 0

Mr. Edmund Garvey, a bounty for a landſcape, 10 10 0

Claſs 130. Mr. Thomas Burgeſs, part of the premium for hiſtorical drawings - - - 5 5 0

Claſs 140. *For Hiſtory Painting.*

Mr. James Durno, jun. a premium, - - 105 0 0

Mr. John Bacon, a bounty for a figure of Mars, as large as Life, in plaſter, - - - 21 0 0

Hono-

Honorary Premiums and Bounties given in POLITE ARTS.

1758. TO Lady Louiſa Grevile, for a drawing, a ſilver medal.

1759. To Miſs Mary Moſer, for extraordinary merit in drawing a vaſe of flowers, a ſilver medal.

To Lady Louiſa Grevile, for etching a view near Warwick, a gold medal.

1760. To Miſs Clayborn Coſley, for etching a landſcape, a gold medal.

To Miſs Maria Hoare, for an hiſtorical drawing, a gold medal.

To Miſs Moore, for a drawing, a ſilver medal.

1767. To Mr. Charles Ruben Riley, for an academy figure, a ſilver pallet.

To Mr. Andrew Van Rymſdyke, for a drawing, a gilt pallet.

To Mr. John Flaxman, for a baſſo relievo in clay, a gilt pallet.

To Mr. Auguſtus Touſaint, for a drawing from pictures, &c. a ſilver pallet.

To Mr. Charles Grignion, for a drawing from pictures, &c. a ſilver pallet.

To Mr. Robert Dighton, for a drawing of a head with a pen, a bounty of a ſilver pallet.

To Mr. Andrew Dickie, for excellent penmanſhip, a bounty of a gold pen.

1768-9. To Mr. Francis Moore, for drawing after a picture, a ſilver pallet.

To Mr. David Watts, for drawing of outlines, a gilt pallet.

To Mr. E. Addis, for a drawing of outlines, a bounty of a ſilver pallet.

1769-70. To Mr. Benjamin Pingo, for a pattern for weavers, a gold pallet.

To Mr. Abraham Mondet, for a pattern for weavers, a gilt pallet.

To Mr. John Flaxman, for a model in clay, a gilt pallet.

To Mr. E. Edwards, for an hiſtorical drawing, a gold pallet.

To Mr. Lewis Pingo, for a model in wax, a gilt pallet.

To Mr. John Kitchenman, for a drawing from the life, a gold pallet.

To Mr. Thomas Clark, for a drawing from the life, a ſilver pallet.

To Mr. Charles Ruben Riley, for a drawing from plaiſter, a gold pallet.

To Mr. William Smith, for a drawing of outlines, a gilt pallet.

To Mr. Thomas Cooke, for a drawing of outlines, a ſilver pallet.

To Mr. George Farrington, for drawing of a landſcape, a gilt pallet.

To Miſs Ann Hewit, for drawings of flowers, a gilt pallet.

1770-1. To Mr. Robert Laurie, for drawing after pictures, a gilt pallet.

To Mr. Henry Stubble, for drawing after pictures, a ſilver pallet.

To Mr. Richard Siſſel, for drawing for weavers, a gilt pallet.

To Mr. Lewis Pingo, for a model of a medal, a gold pallet.

To Mr. John Flaxman, for a baſſo relievo in clay, a gold pallet.

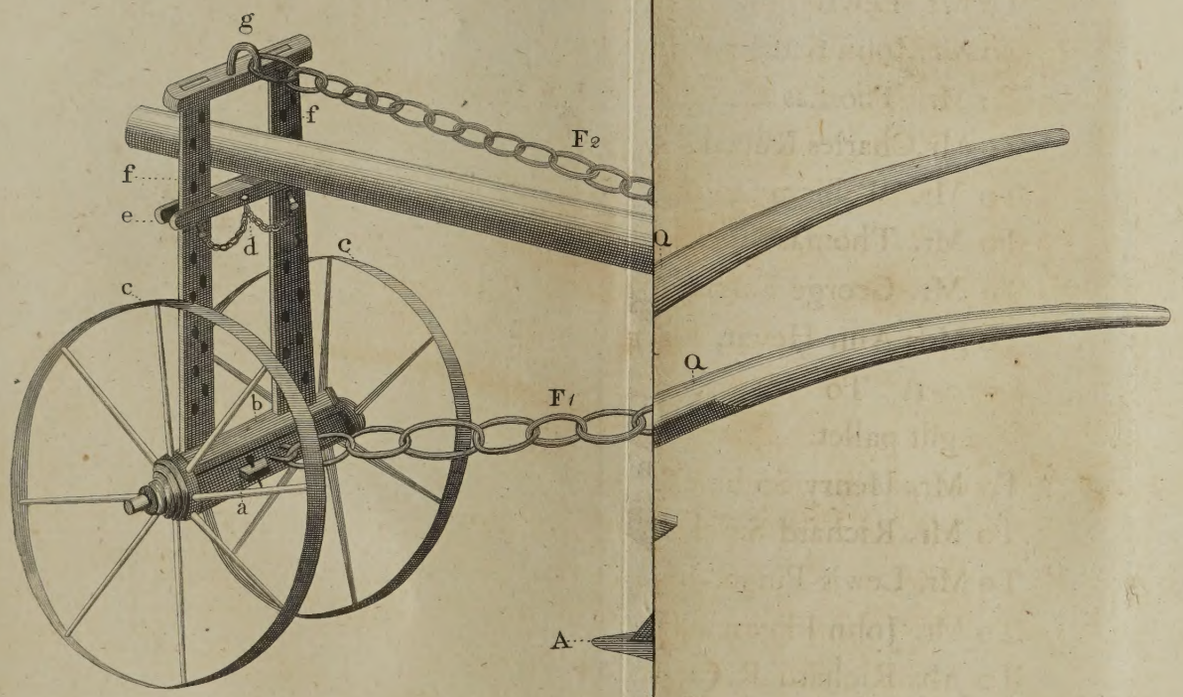
To Mr. Richard Reed, for a drawing of outlines, a gilt pallet.

To Mr. Leonard Willamot, for a drawing of outlines, a gilt pallet.

To Mr. Joſeph Slater, for drawing of horſes, a gilt pallet.

To Mr. John Shelley, for drawing in Indian ink, a ſilver pallet.

F I N I S.



Share.

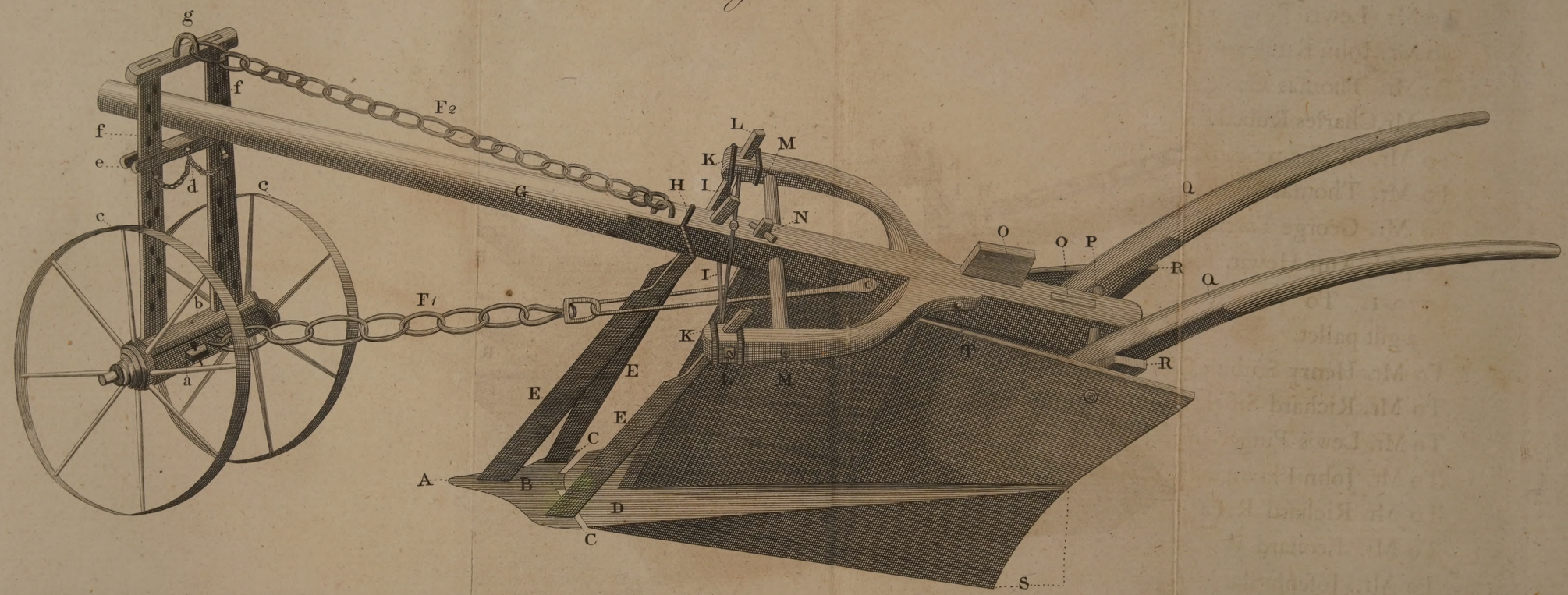
A

Baily delin.

J. Fougeron sculp.t

Perspective View of Mr. Knowles Drain Plough.

Fig. 1st



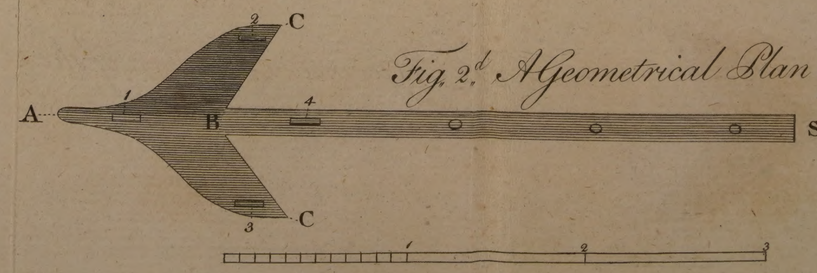


Fig. 2d. A Geometrical Plan of the Share.

Baily delin.

J. Fougeron sculpt.

Geometrical

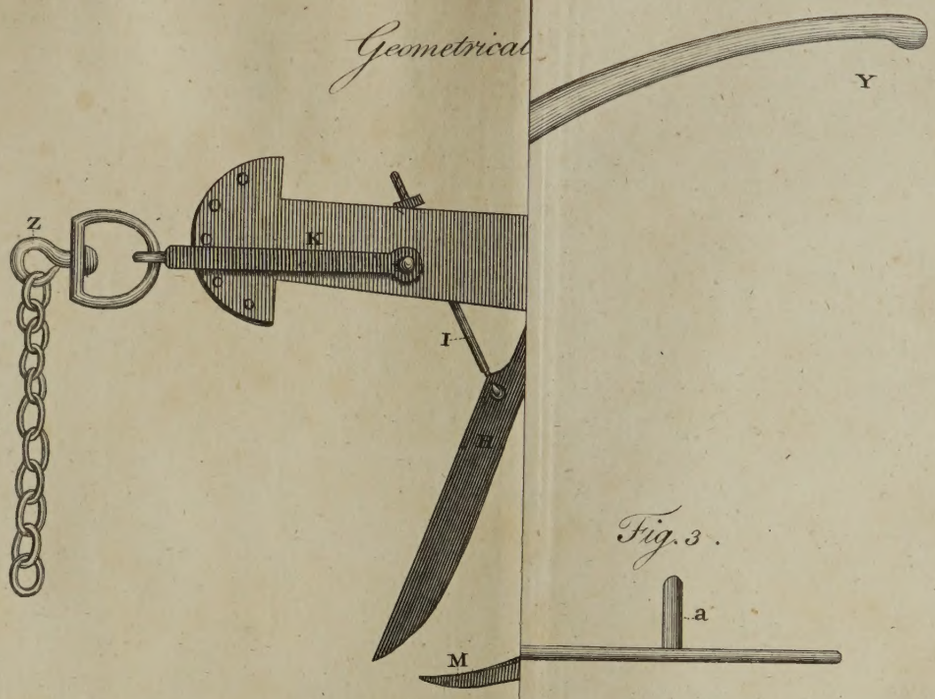
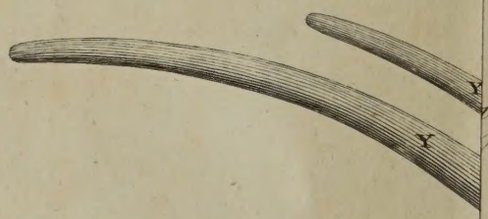


Fig. 3.



ugh.

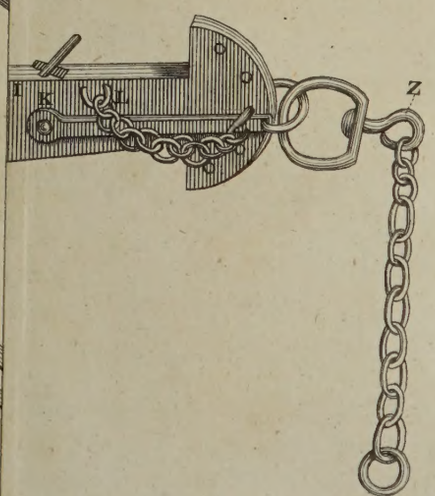
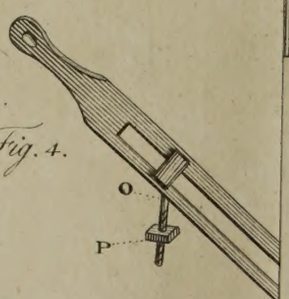


Fig. 4.



A. M. Bailey delin.

T. Miller sculp.

Geometrical Elevation of M.r Makins' Drain Plough.

Fig. 2.

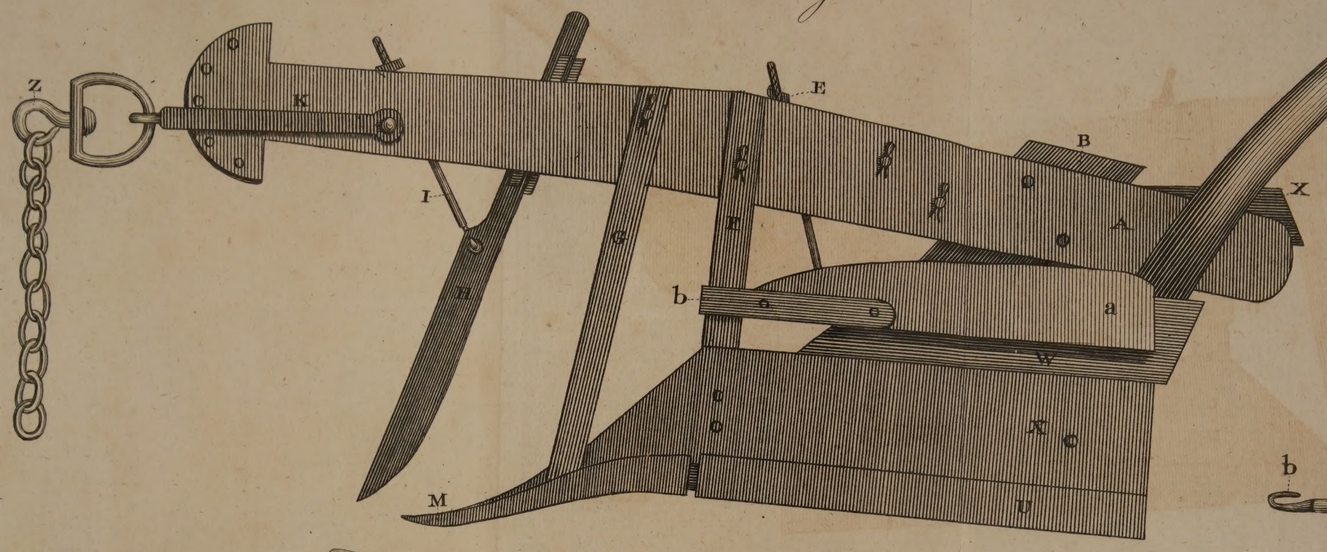
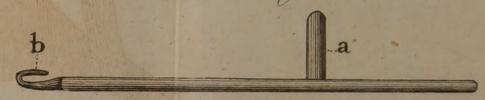


Fig. 3.



A Perspective View of the right Side of the Plough.

Fig. 1.

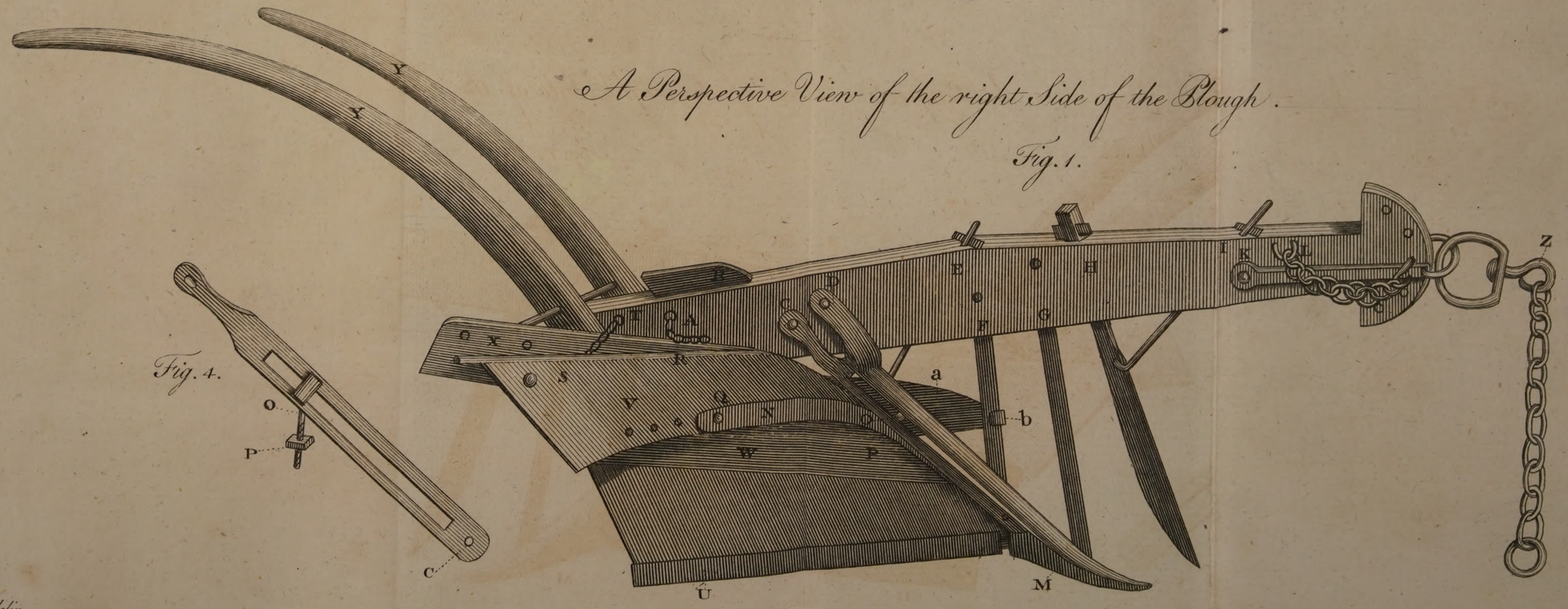


Fig. 4.

A. M. Bailey delin.

T. Miller sculp.

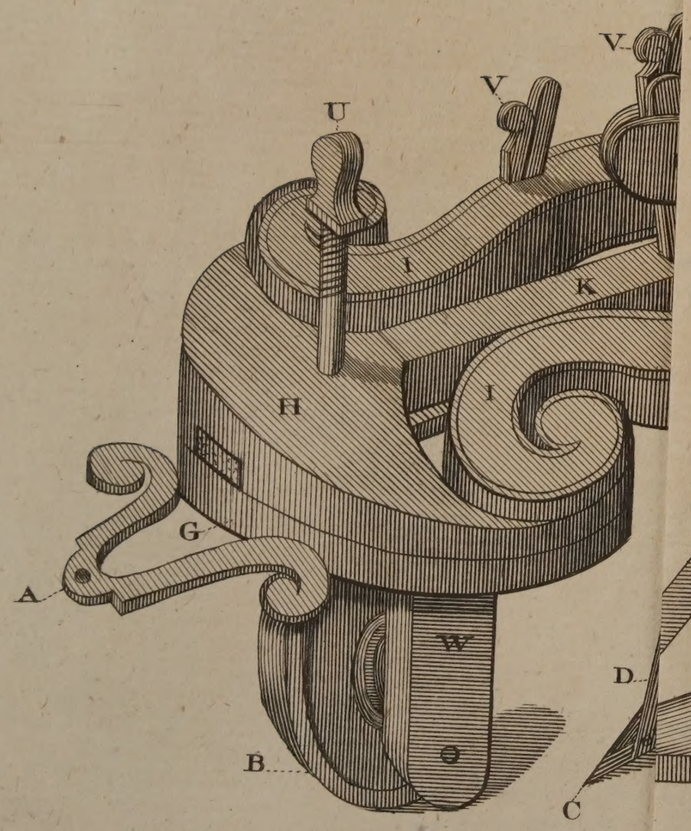
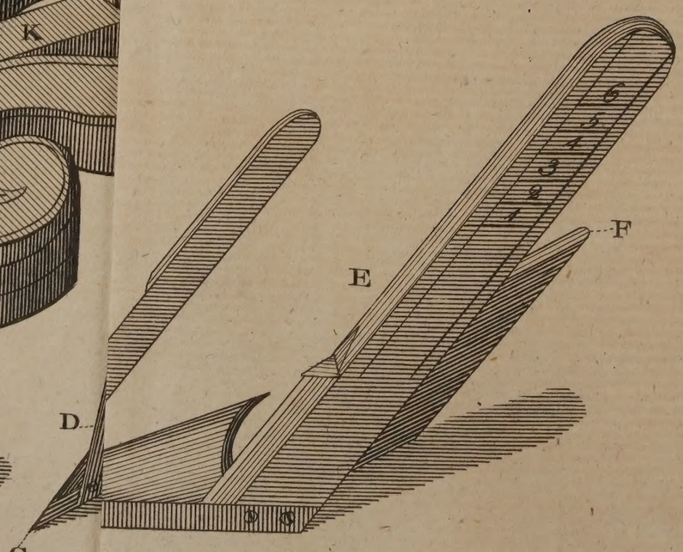


Fig. 9.

Fig 2.



T. Miller sculp.

A Perspective View of Mr. Gee's Six Furrow Plough.

Plate 1. Fig 1.

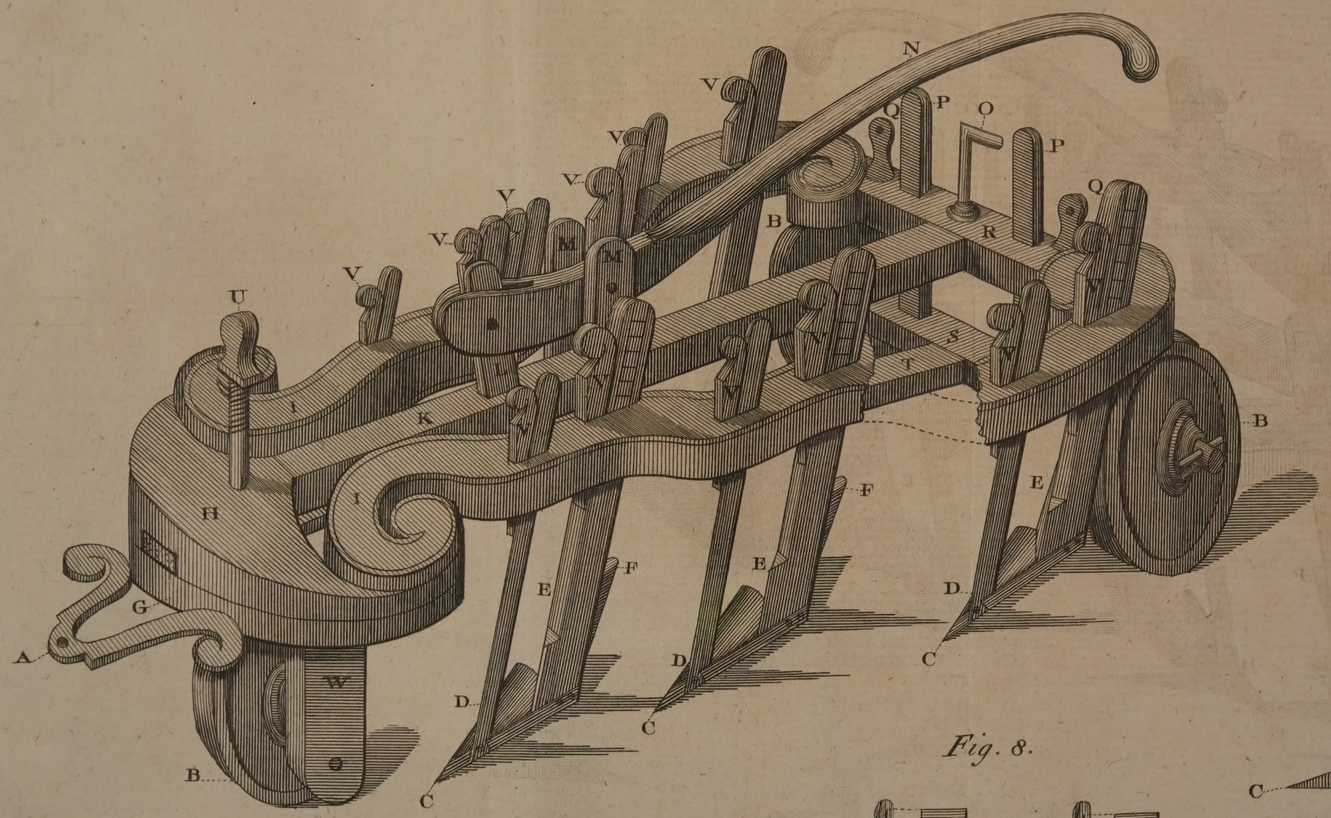


Fig. 9.

Fig. 8.

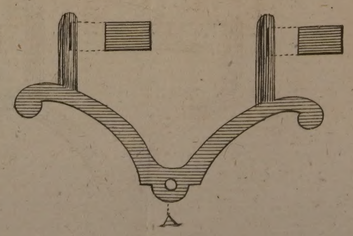
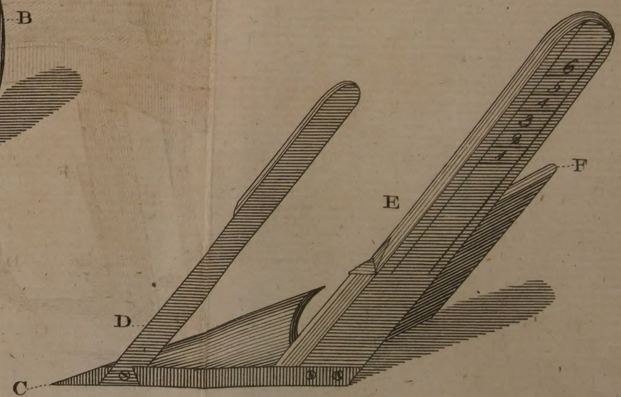


Fig 2.



T. Miller sculp.

Fig. 6.

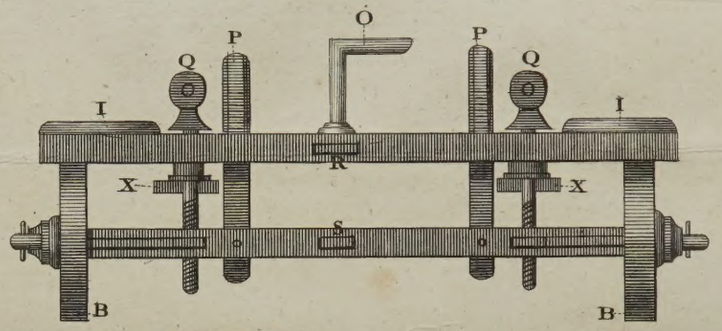
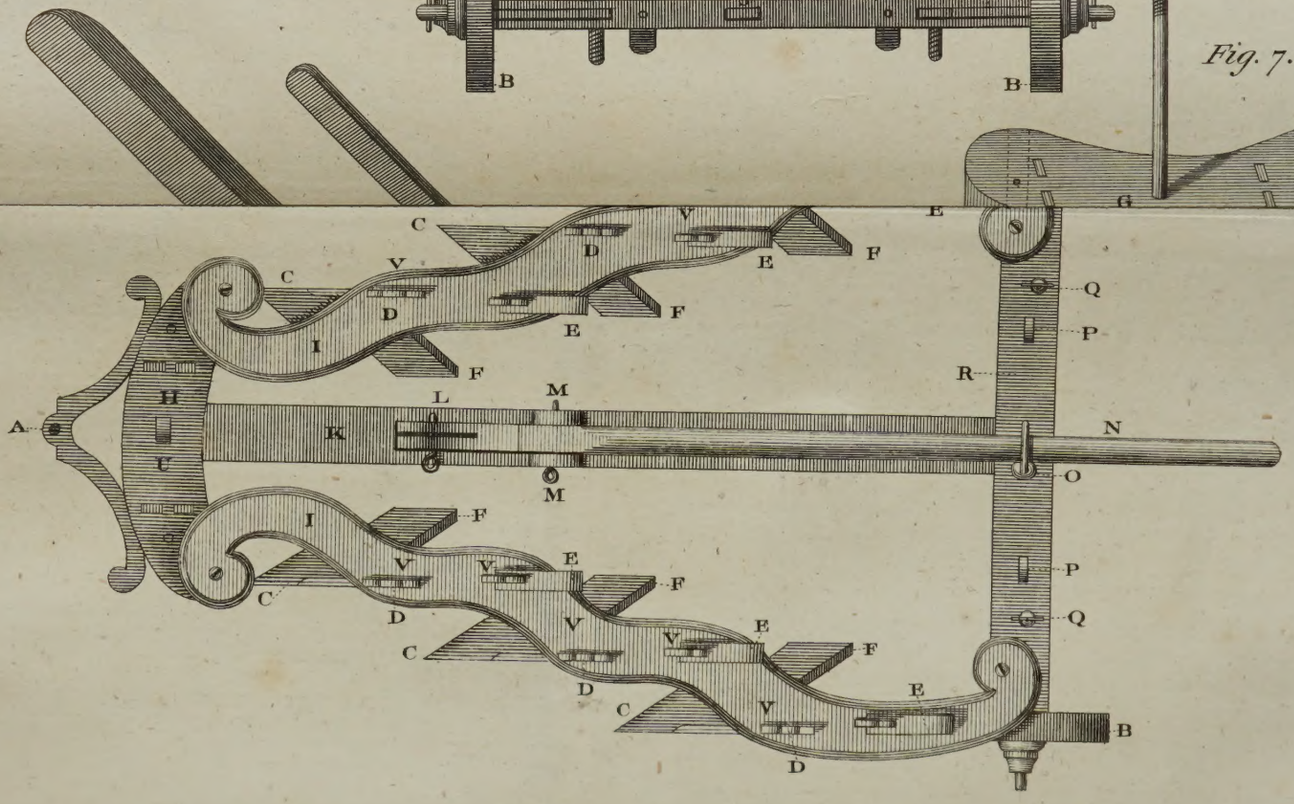


Fig. 7.



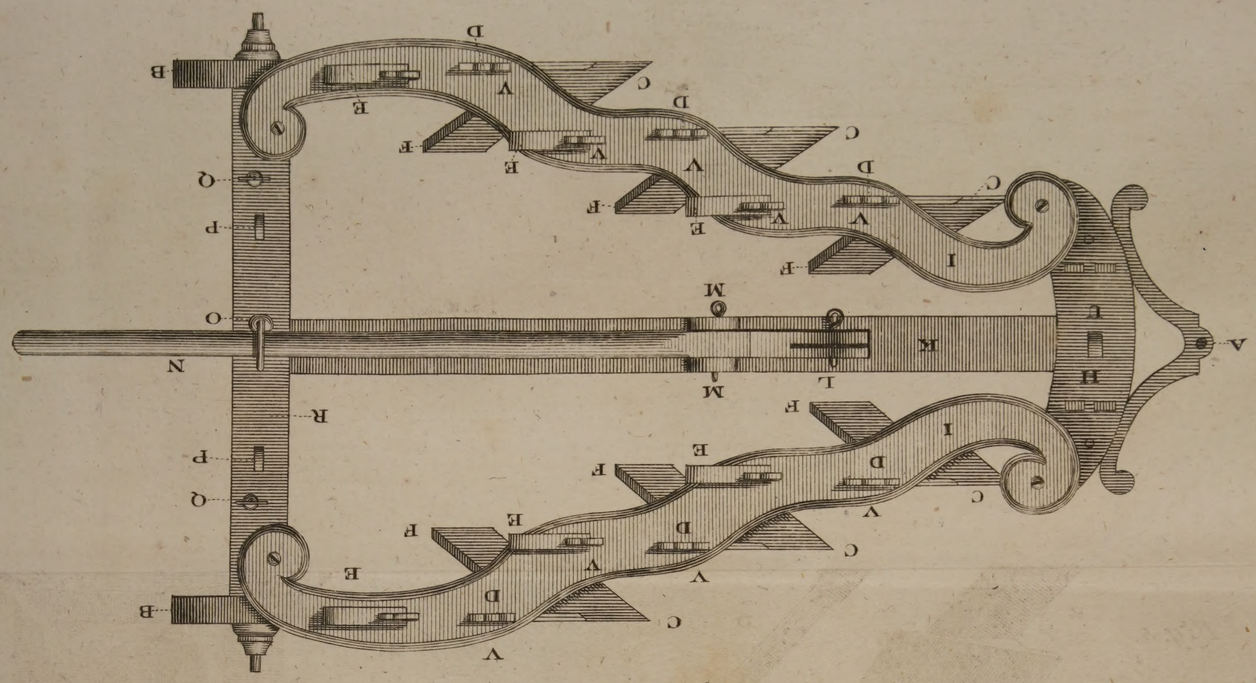
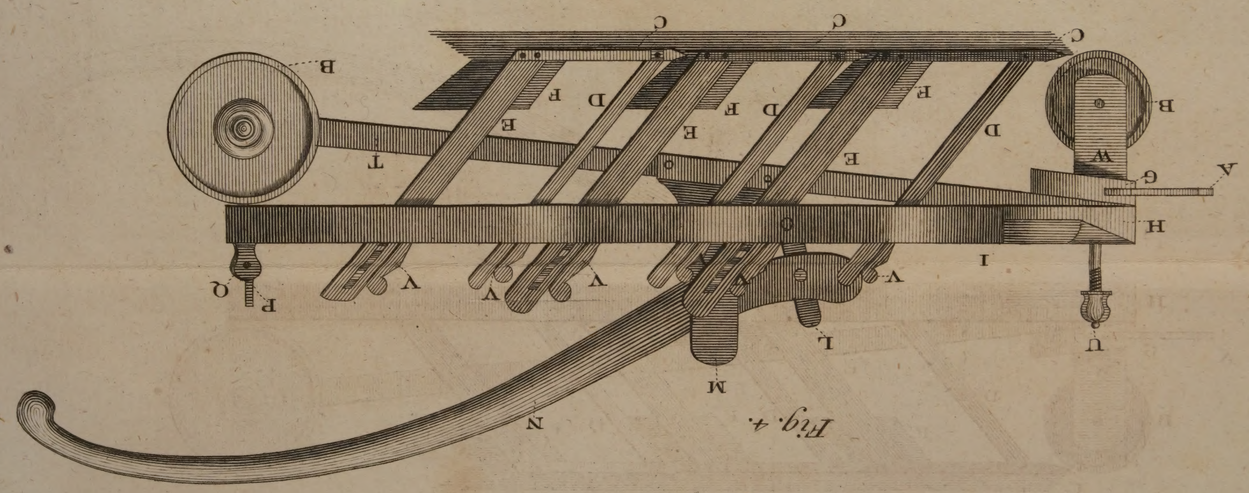


Fig. 3.



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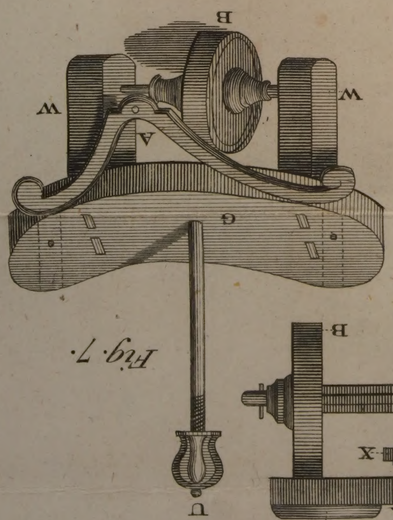

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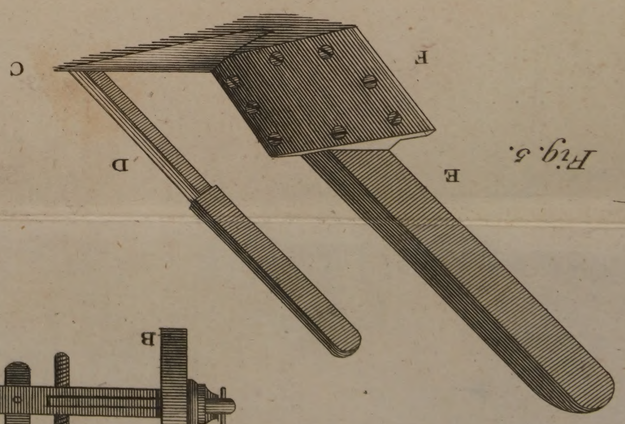

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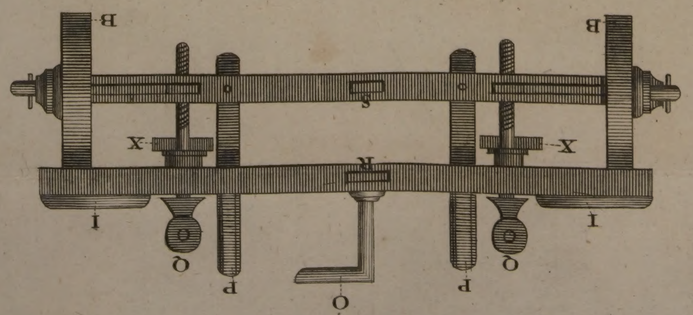
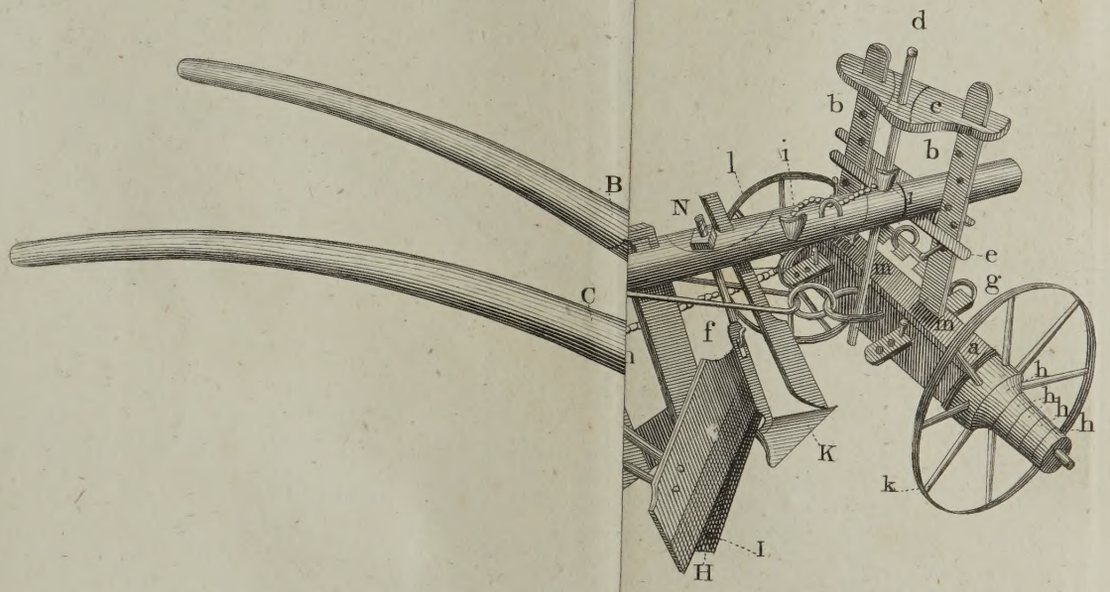


Fig. 6.

N° V p 23

Perspe



6

A.M. Bailey del.

T. Miller sculp.

Perspective View of Mr. Ducket's three Furrow Plough.

Fig. 1

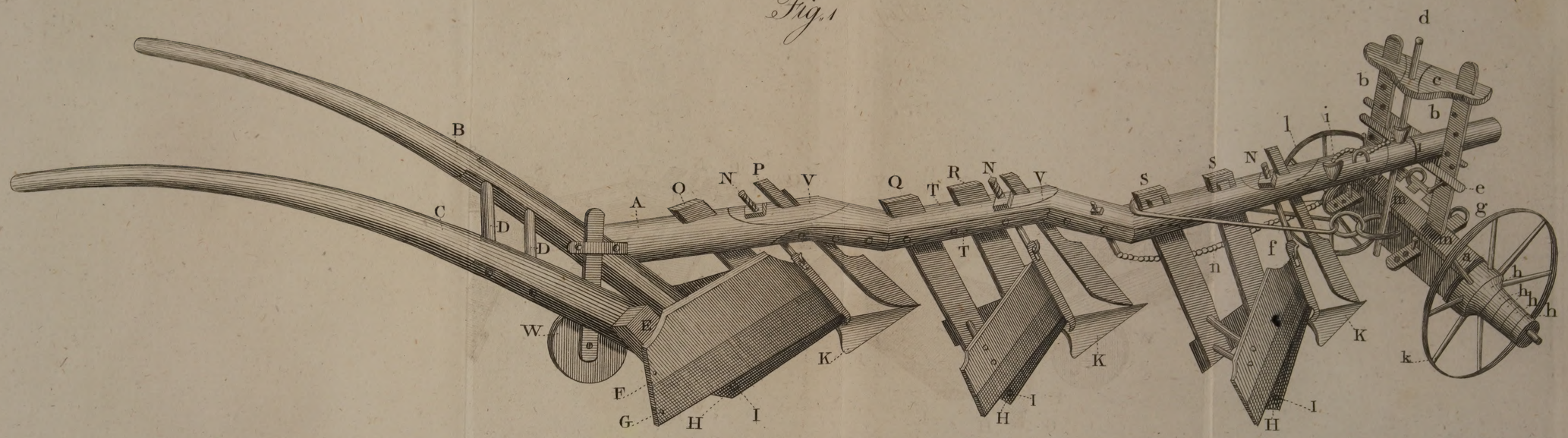
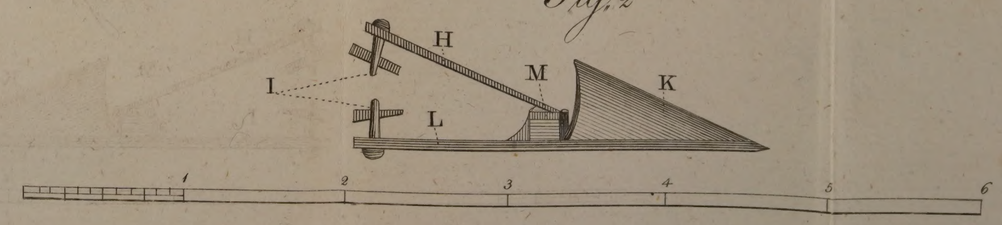


Fig. 2



A. M. Bailey del.

T. Miller sculp.

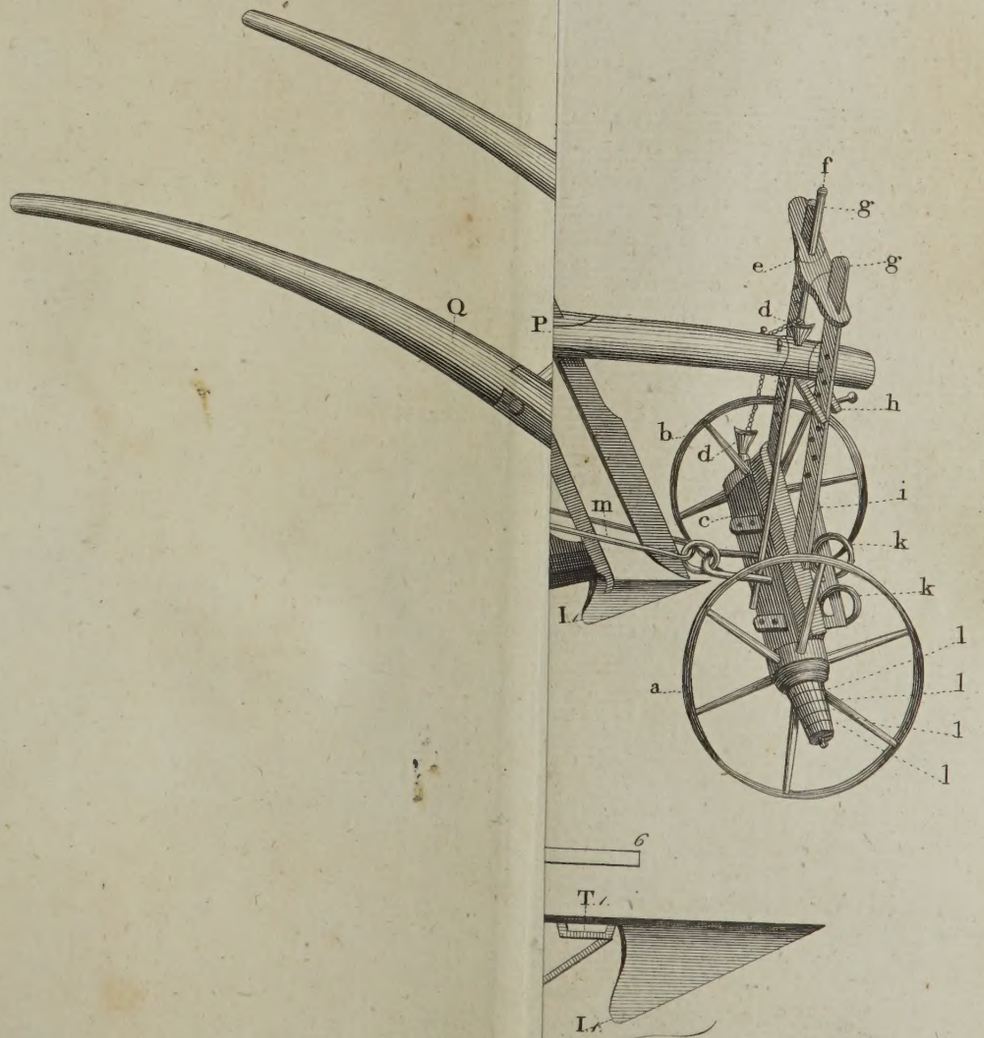


Fig. 3.d

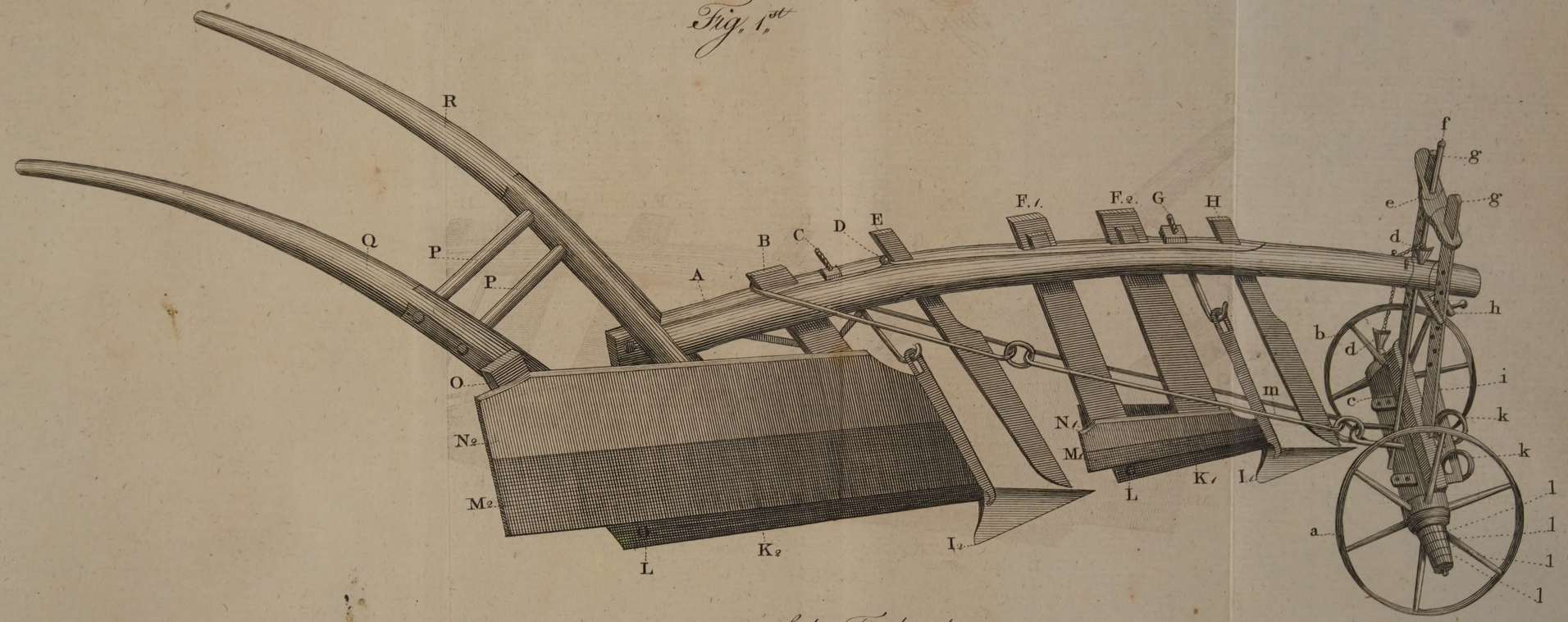
the fore Share &c.

Alex.r Mabyn Bailey delin.

T. Miller sculp.

A Perspective View of M.r Ducket's Trenching Plough.

Fig. 1.st



Scale to Fig. 2.d 2. 3.d

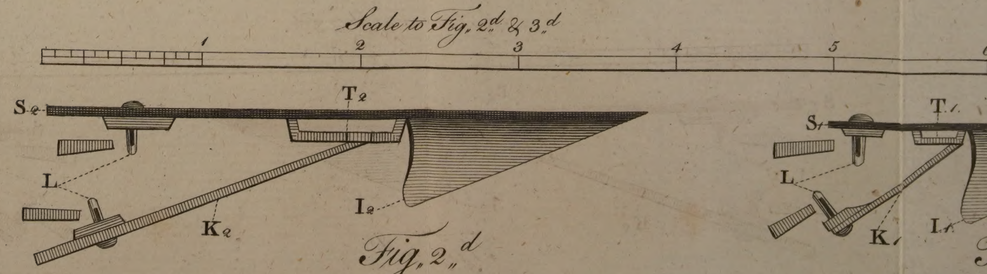


Fig. 2.d

Geometrical plan of the hind Share &c.

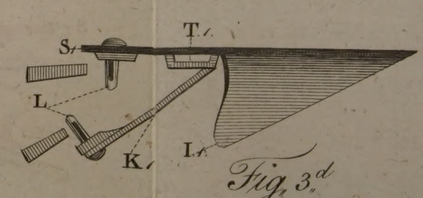


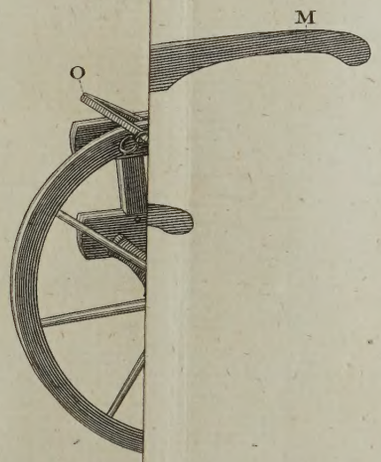
Fig. 3.d

Ditto of the fore Share &c.

Alex.r Mabyn Bailey delin:

T. Miller sculp.

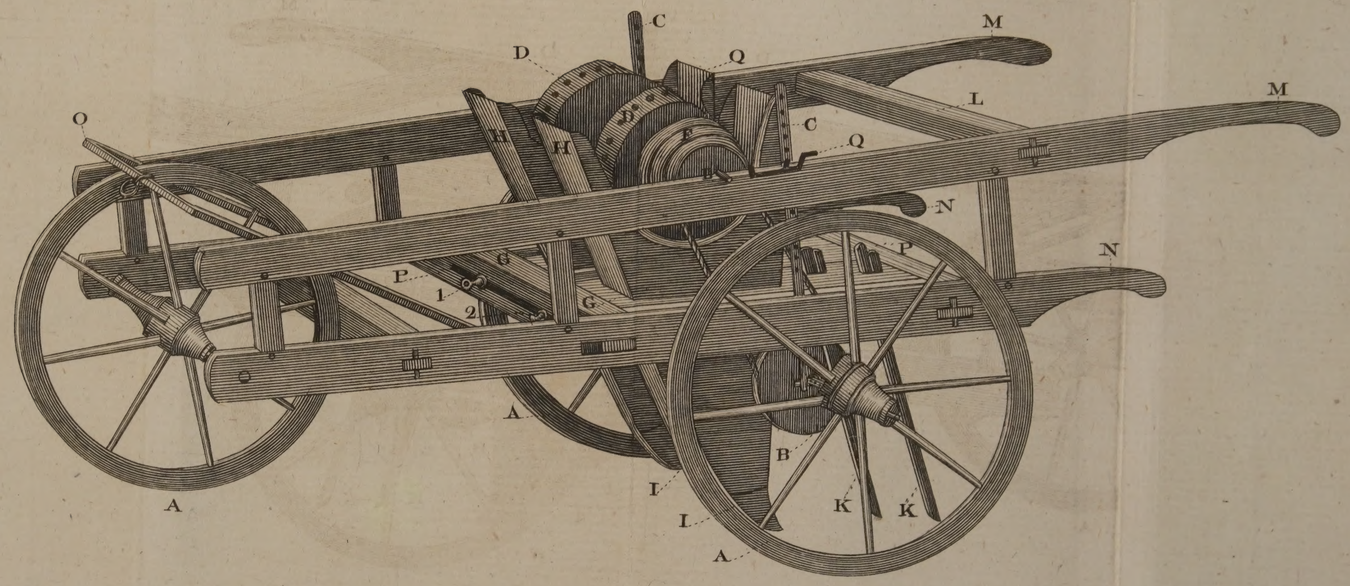
Plate 1.



Arz M. Bailey del.

T. Miller sculp.

Plate 1. Fig. 1. A Perspective View of Mr. Willey's Drill Plough.



Ar.s M. Bailey del.

T. Miller sculp.

Fig 2.

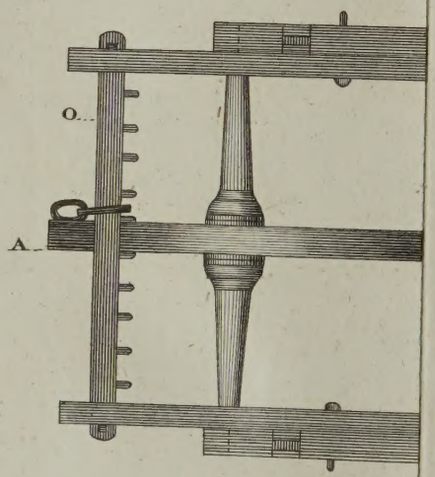


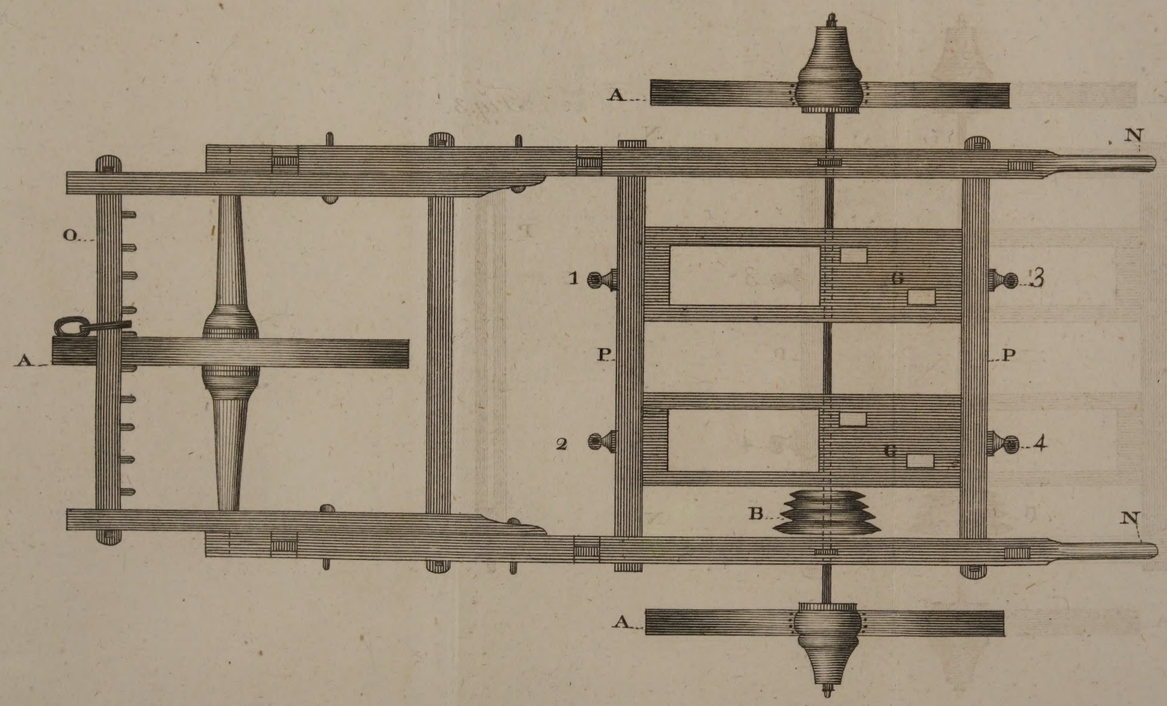
Fig. 4.

Fig. 5.

A. M. Bailey delin.

T. Miller sculp.

Fig 2. Plan of Mr. Willey's Drill Plough.



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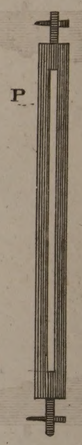
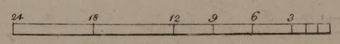


Fig. 4.

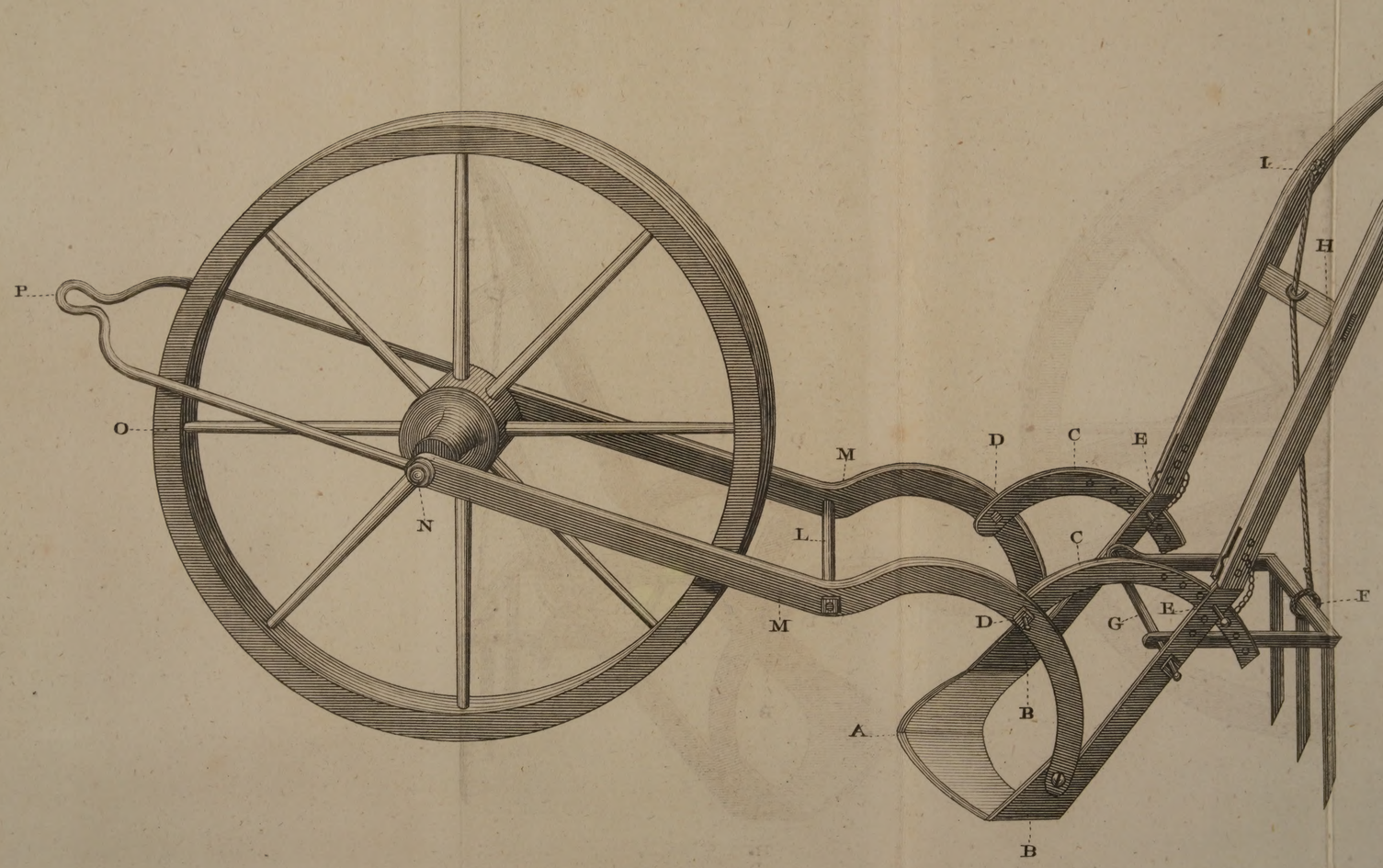
Fig. 5.



A. M. Bailey delin.

T. Miller sculp.

A Perspective View of the Revd. Mr. Hewit's Horse Hoe & Harrow.



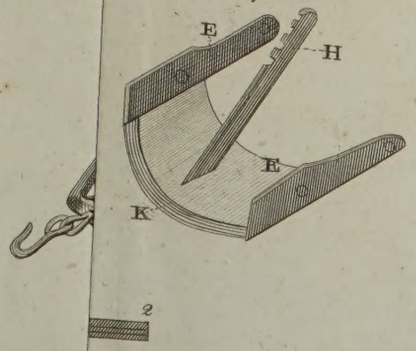
A. M. Bailey delin.

J. Miller sculp.

A

Fig. 3.

Perspective View of the Share.



Bailey del.

I. Fougeron Junr. sculp.

A Perspective View of the Revd. Mr. Henvit's Horse Hoe.

Fig. 1.

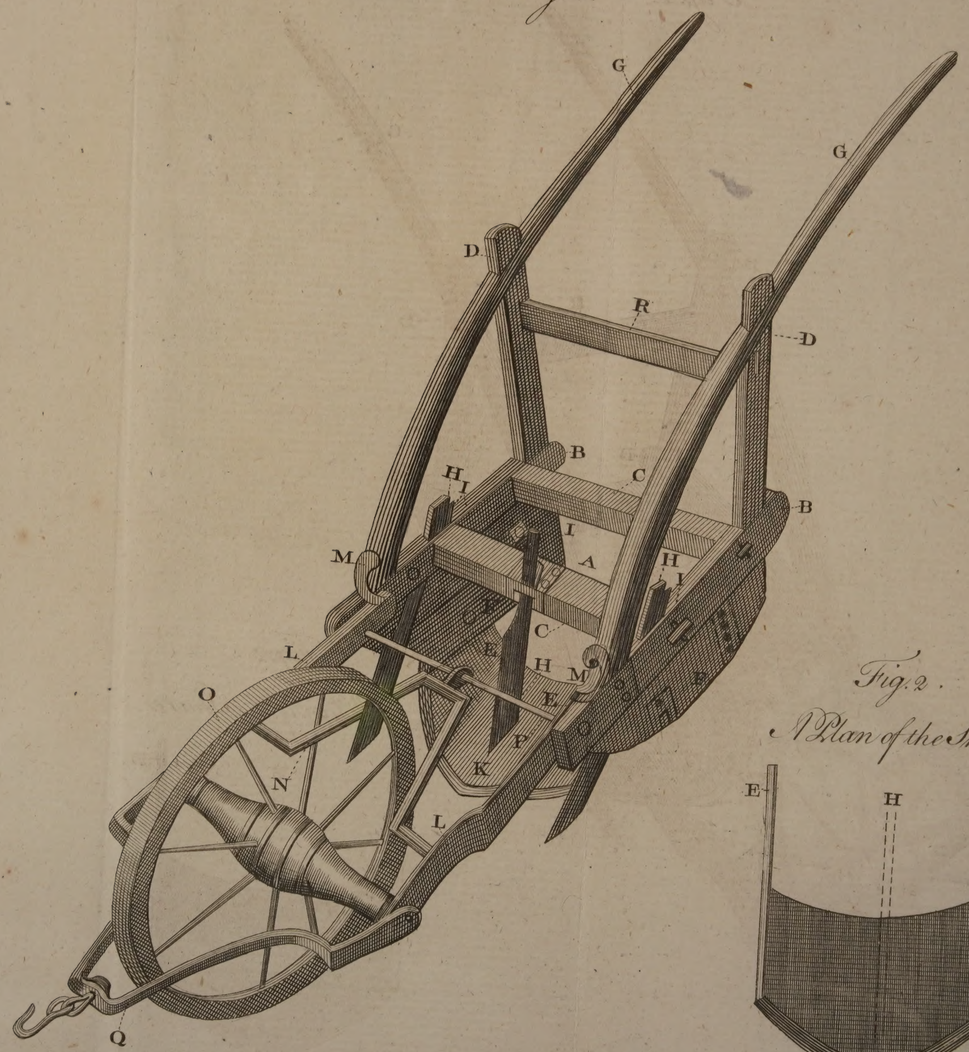
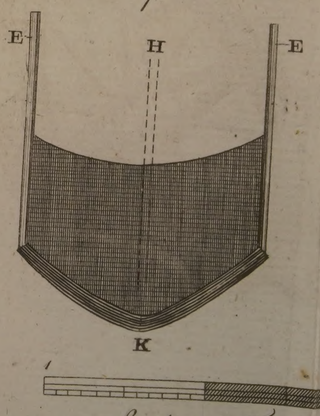


Fig. 2.

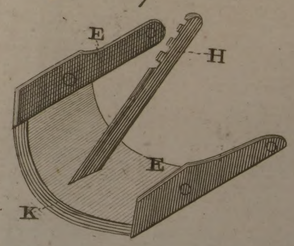
A Plan of the Share.



Scale to Fig 2.

Fig. 3.

Perspective View of the Share.

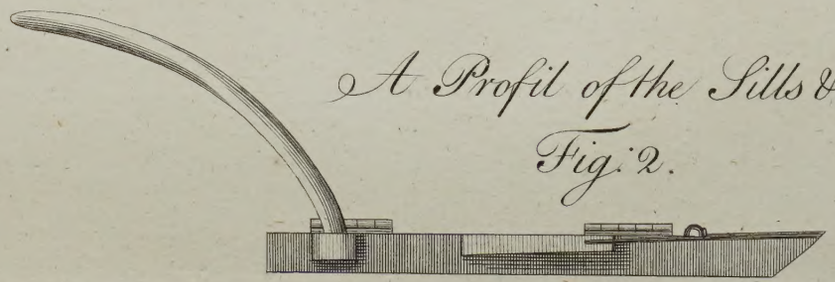


Bailey del.

I. Fougeron Junr. sculp.

A Profil of the Sills &c.

Fig: 2.



Ground.

Fig: 1.st

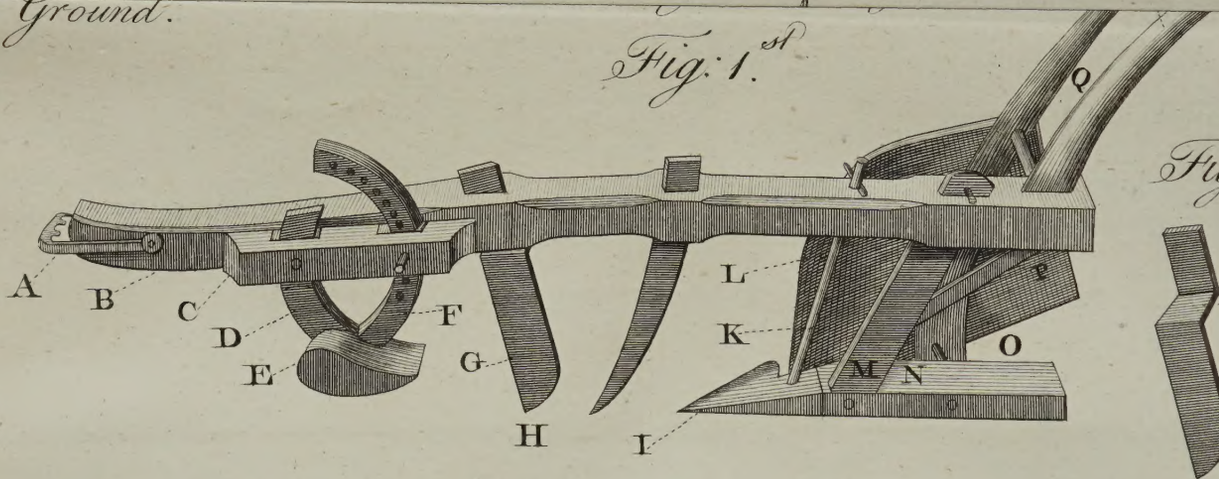
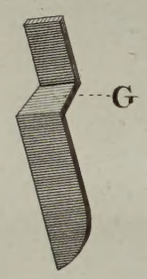


Fig: 2.

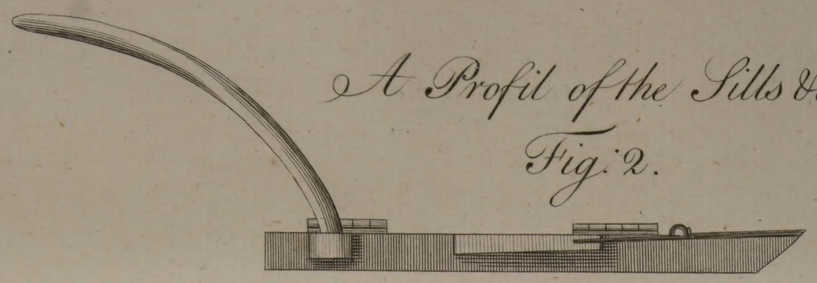


Bailey del.

I. Fougeron sculp.

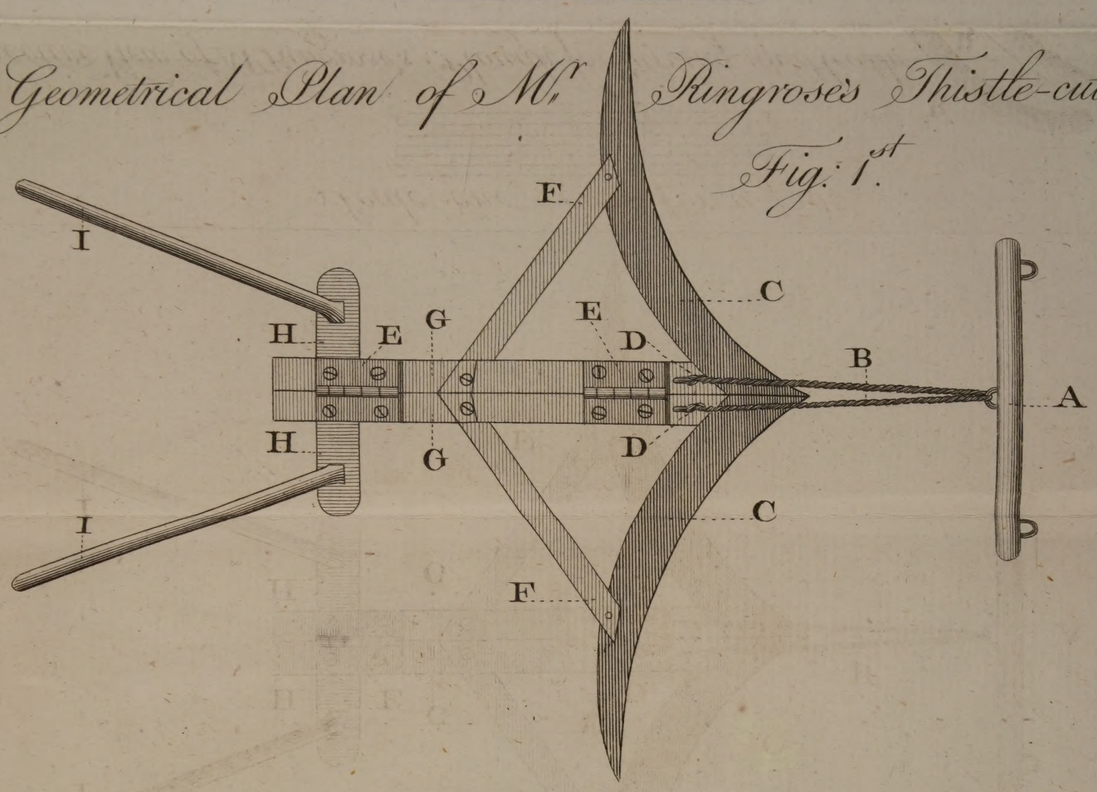
A Profil of the Sills &c.

Fig: 2.

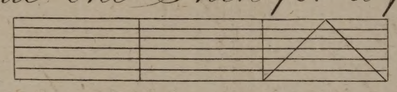


Geometrical Plan of Mr. Ringrose's Thistle-cutter

Fig: 1st.



Scale one Inch for a foot



A Perspective View of Mr. Ringrose's Plough for turning up Heath-Ground.

Fig: 1st.

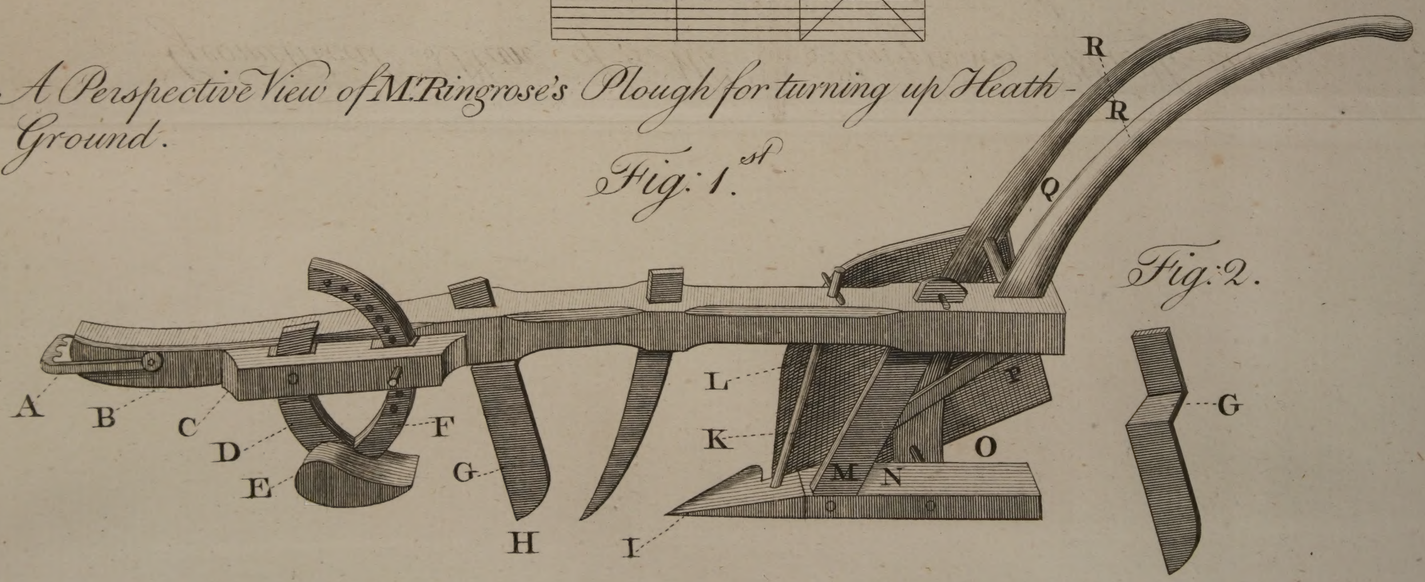


Fig: 2.

Bailey del.

I. Fougeron sculp.

A Perspec

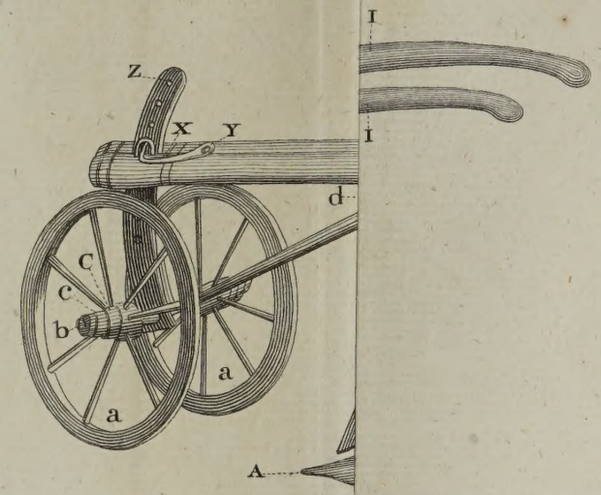
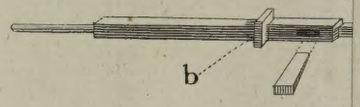


Fig. 2.



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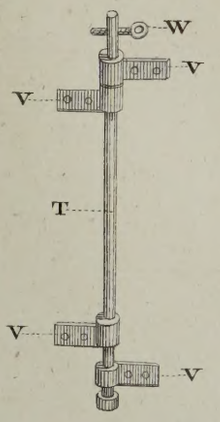
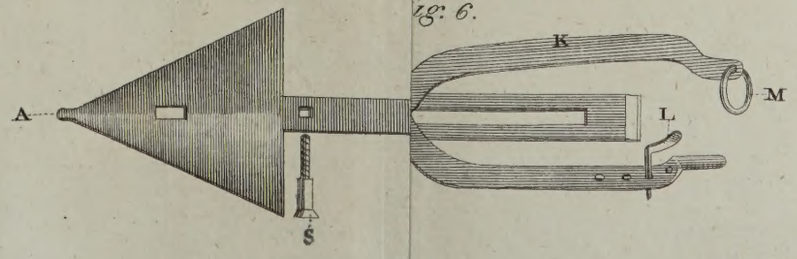


Fig. 7.

Fig. 6.



Wm. Martyn Bailey del.

J. Vitalba sc.

A Perspective View of M.r Arbuthnot's Double Furrow Plough

Fig. 1.

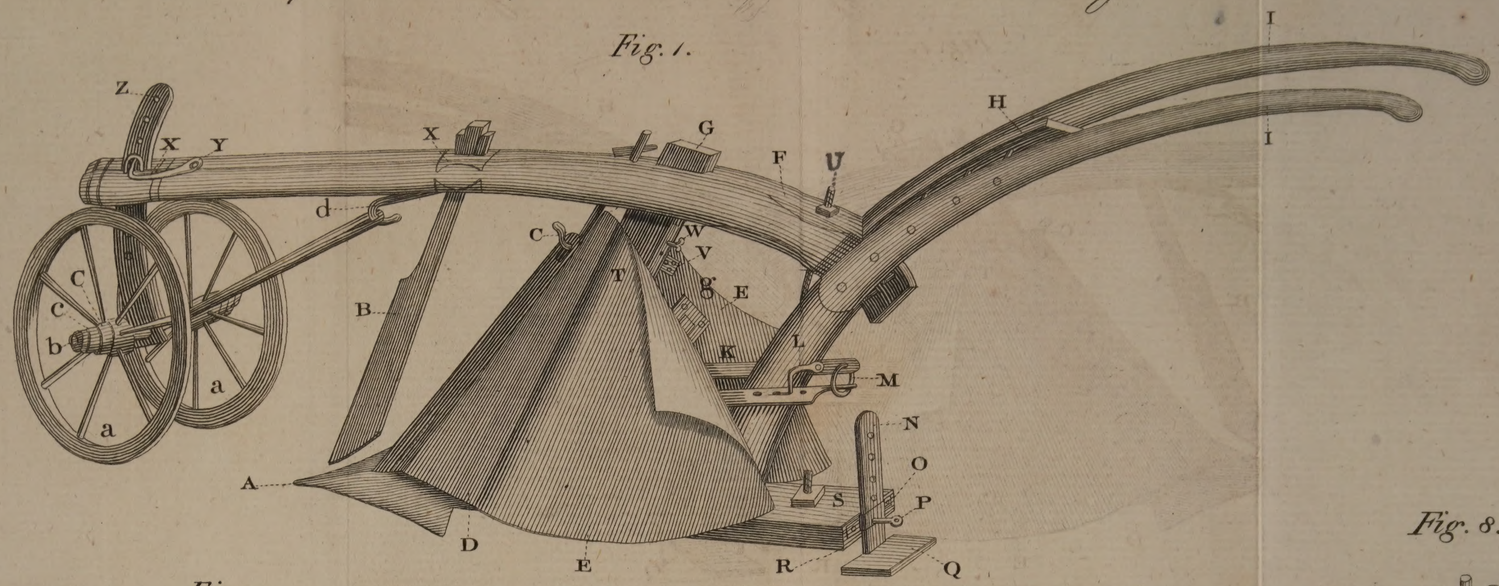
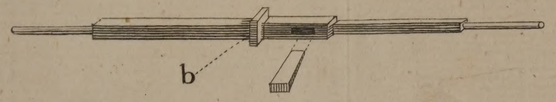


Fig. 2.



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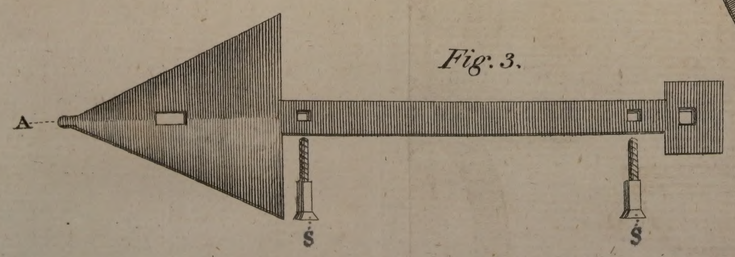

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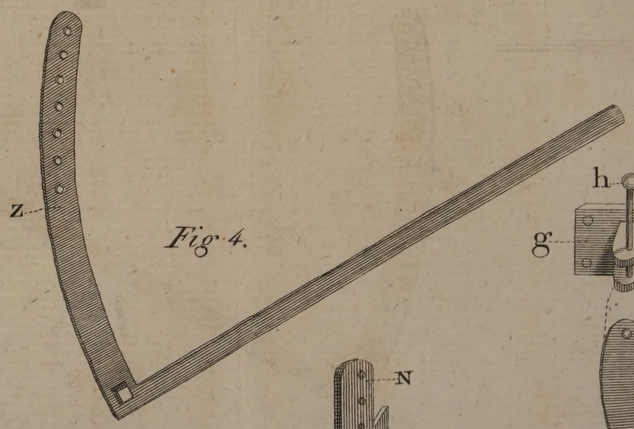

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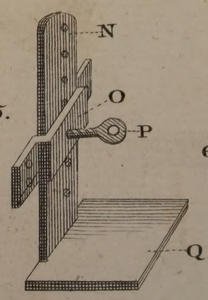

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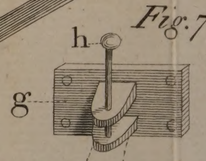

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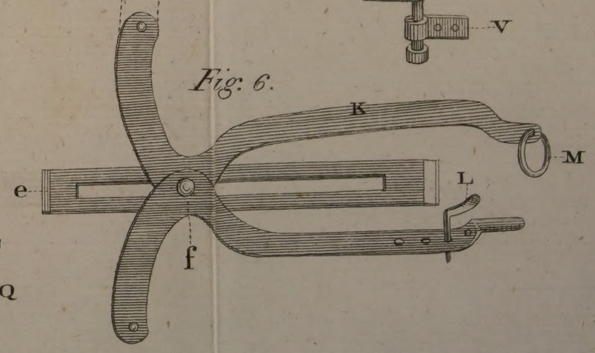

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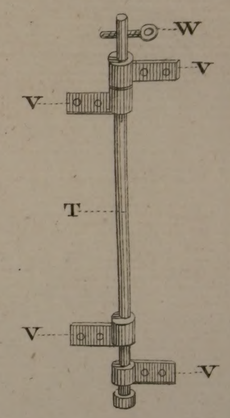
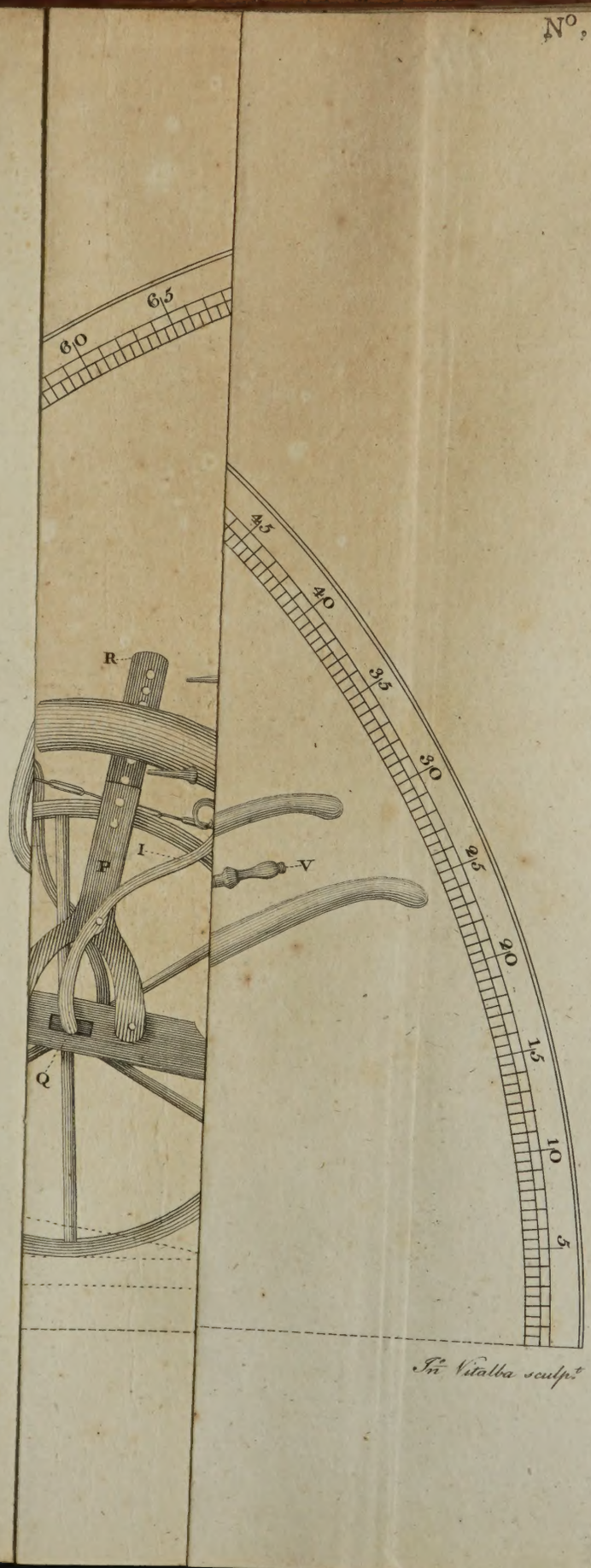


Max.r Malyn Bailey del.

J. Vitalba sc.



Jn° Vitalba sculp.t

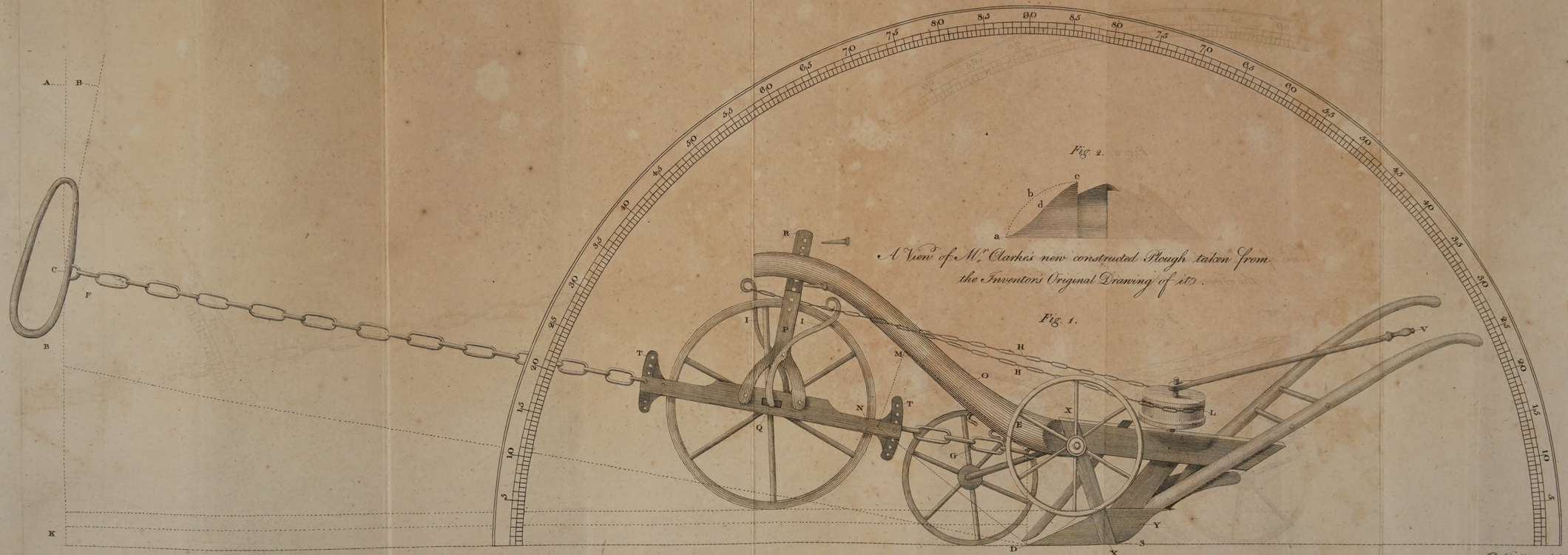


Fig. 2.

A View of Mr. Clarkes new constructed Plough taken from the Inventors Original Drawing of it.

Fig. 1.

Fr. Vitalba sculpt.

A Perspe

Fi

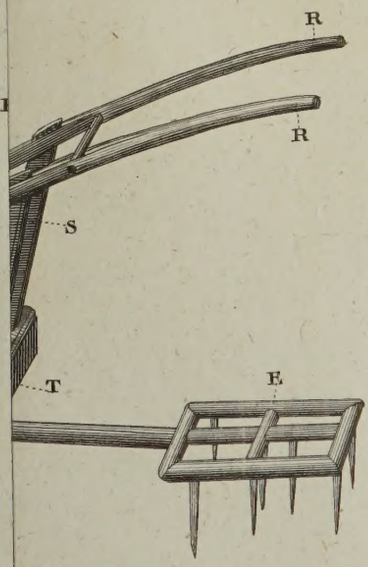
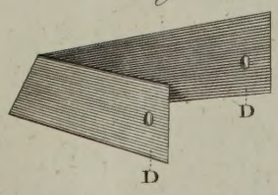


Fig 2.

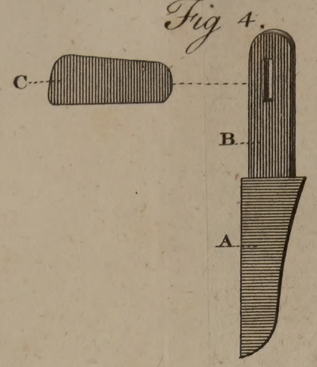


Alex.r Matyn Bailey del.

T. Miller sculp.

A Perspective View of Mr. Lloyd's Horse Hoe, and Harrow.

Fig 4.



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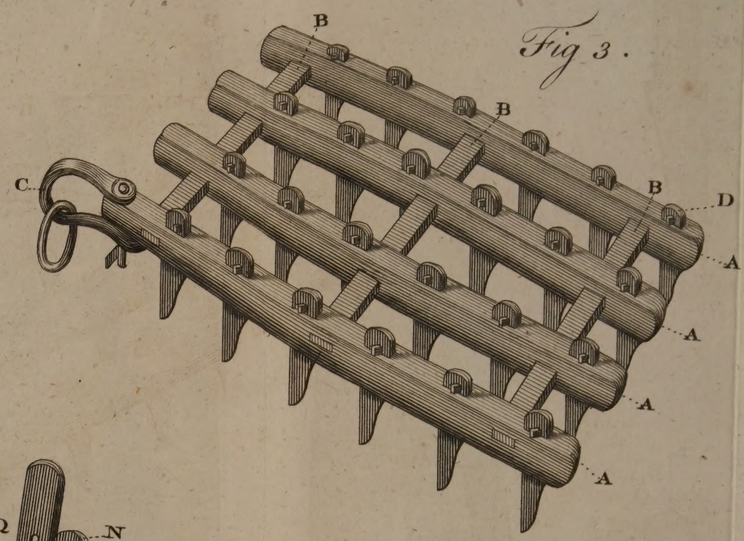


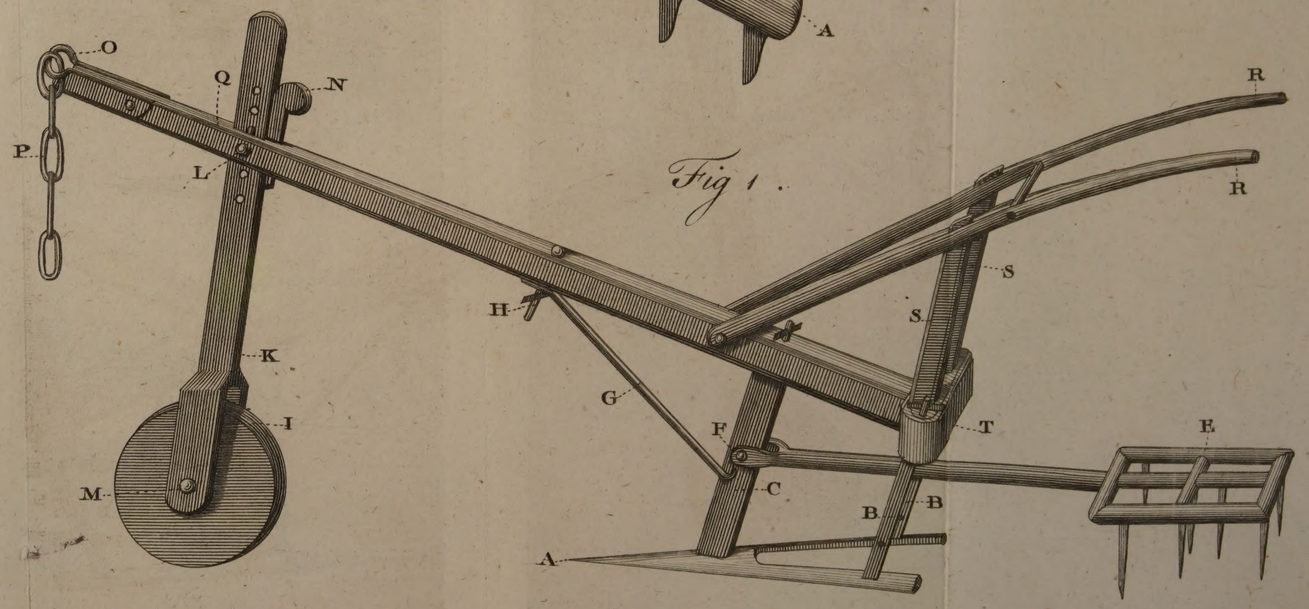
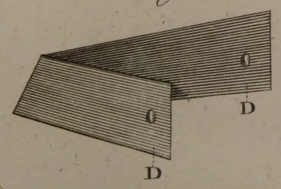


Fig 1.

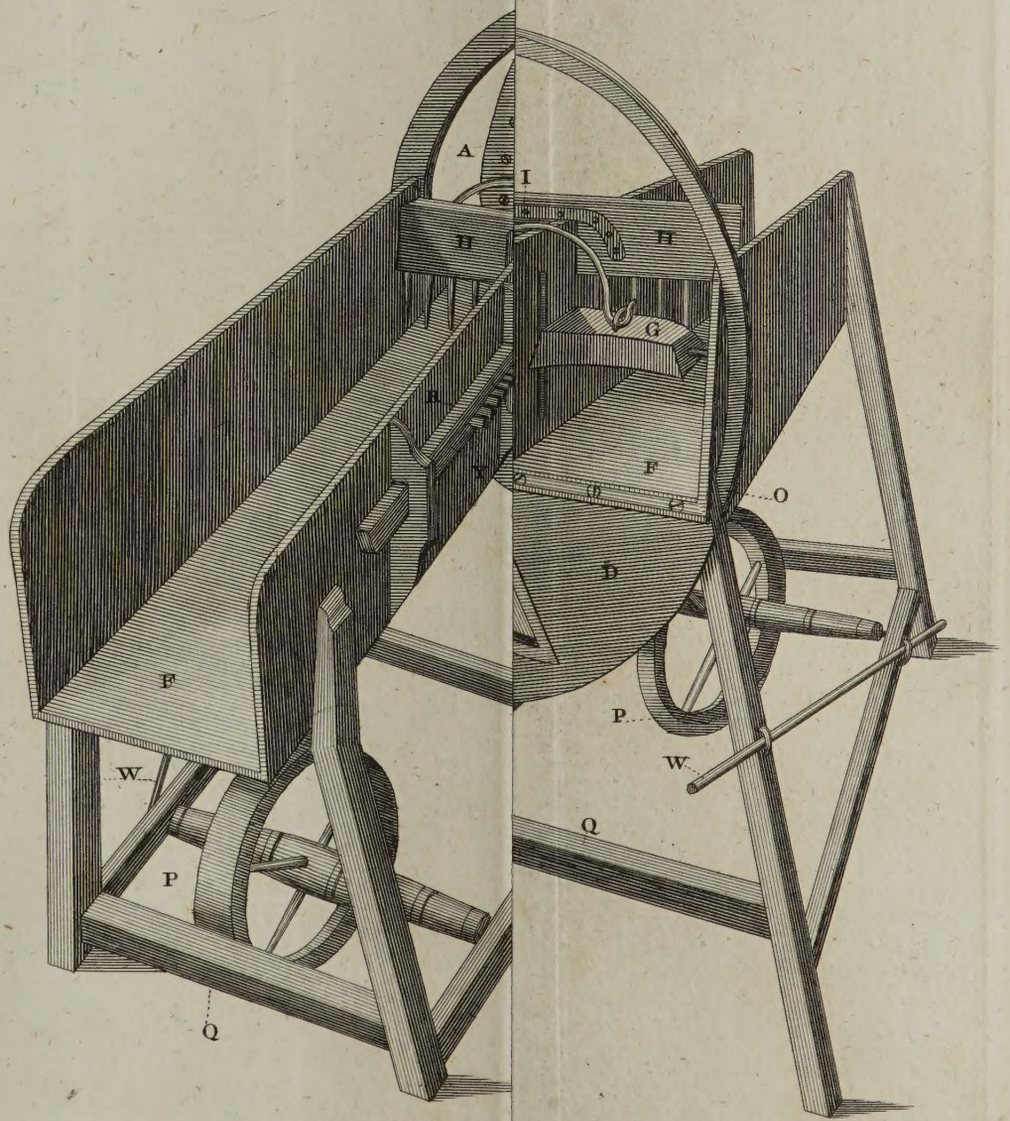
Fig 2.



Alex.r Mabyn Bailey del.

T. Miller sculp.

A Perspective View of Mr.



W. Bailey Junr. delin.

T. Miller sculp.

A Perspective View of Mr. Edgills Chaff Machine,

Fig. 1.

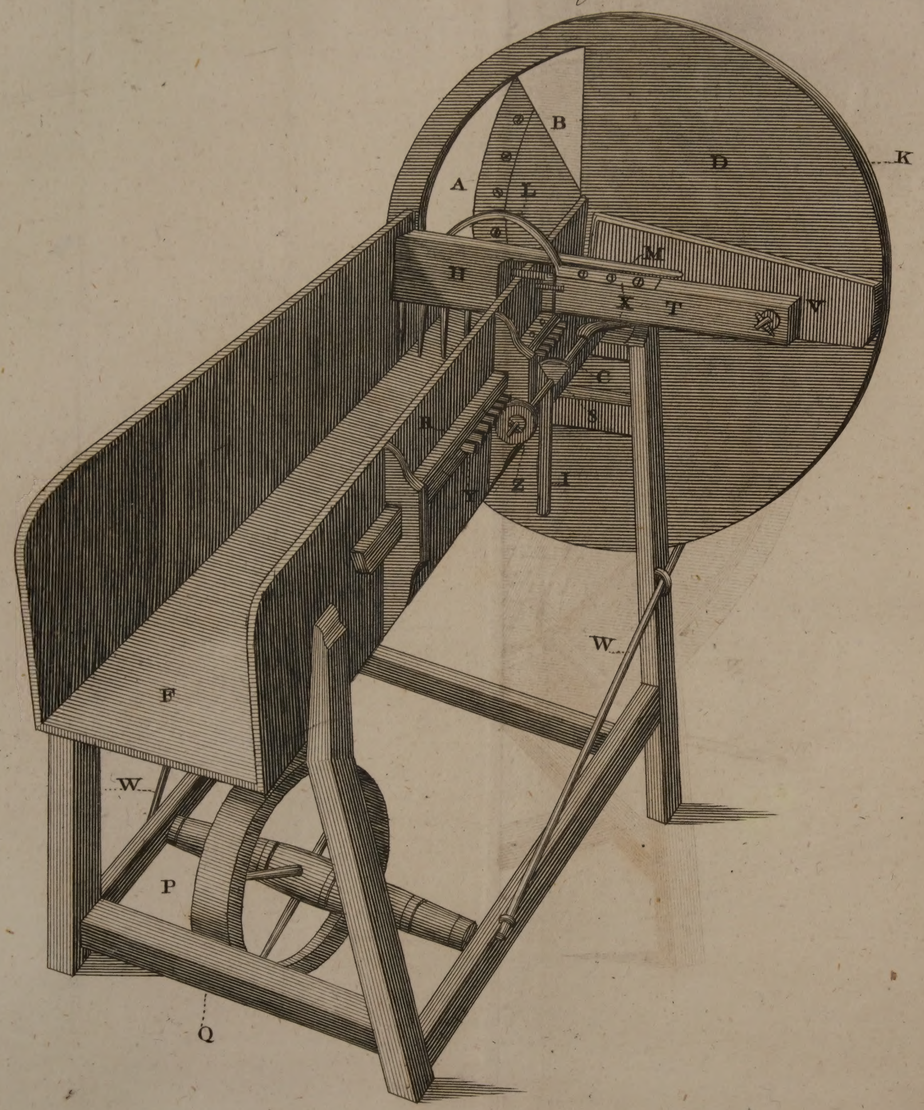
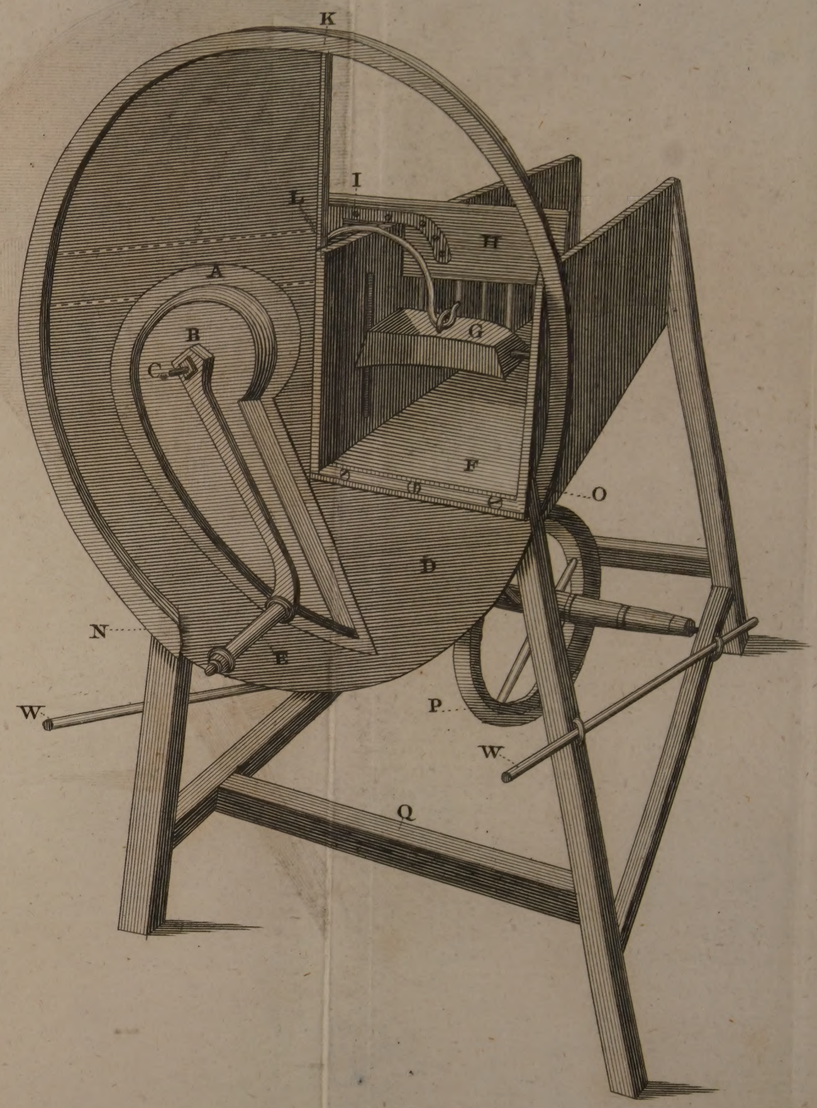
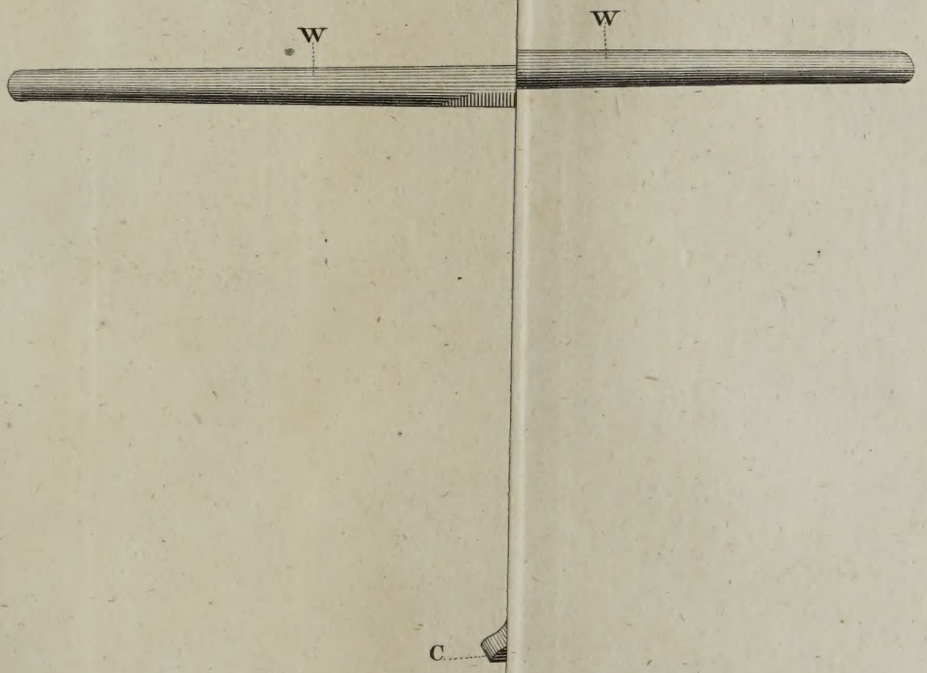


Fig. 2.



W. Bailey Junr. delin.

T. Miller sculp.

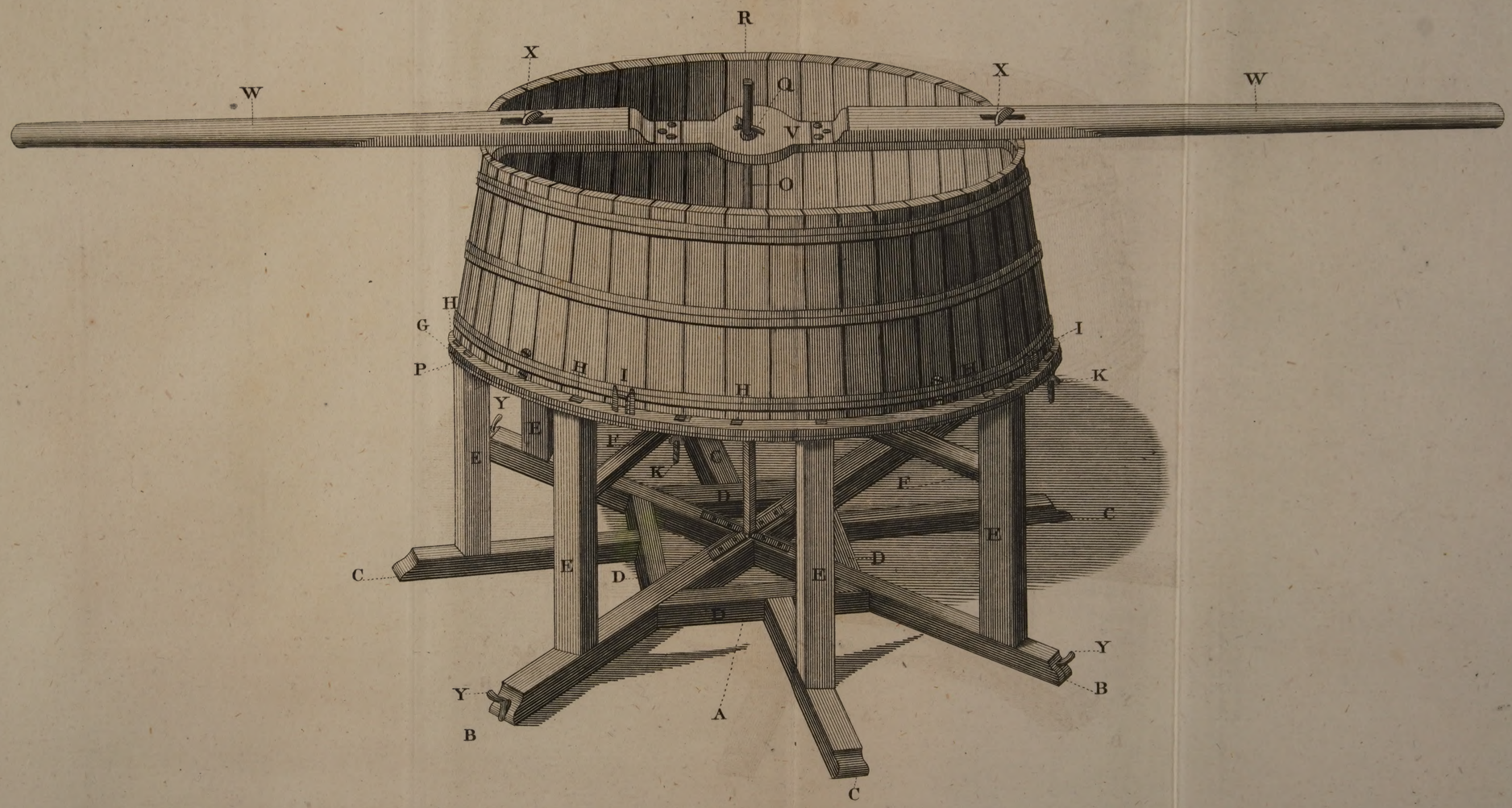


A. M. Bailey del.

T. Miller sculp.

Fig. 1st

A Perspective View of a Machine for slicing Turneps.



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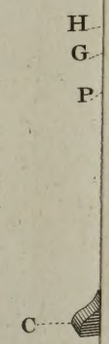
T. Miller sculp.



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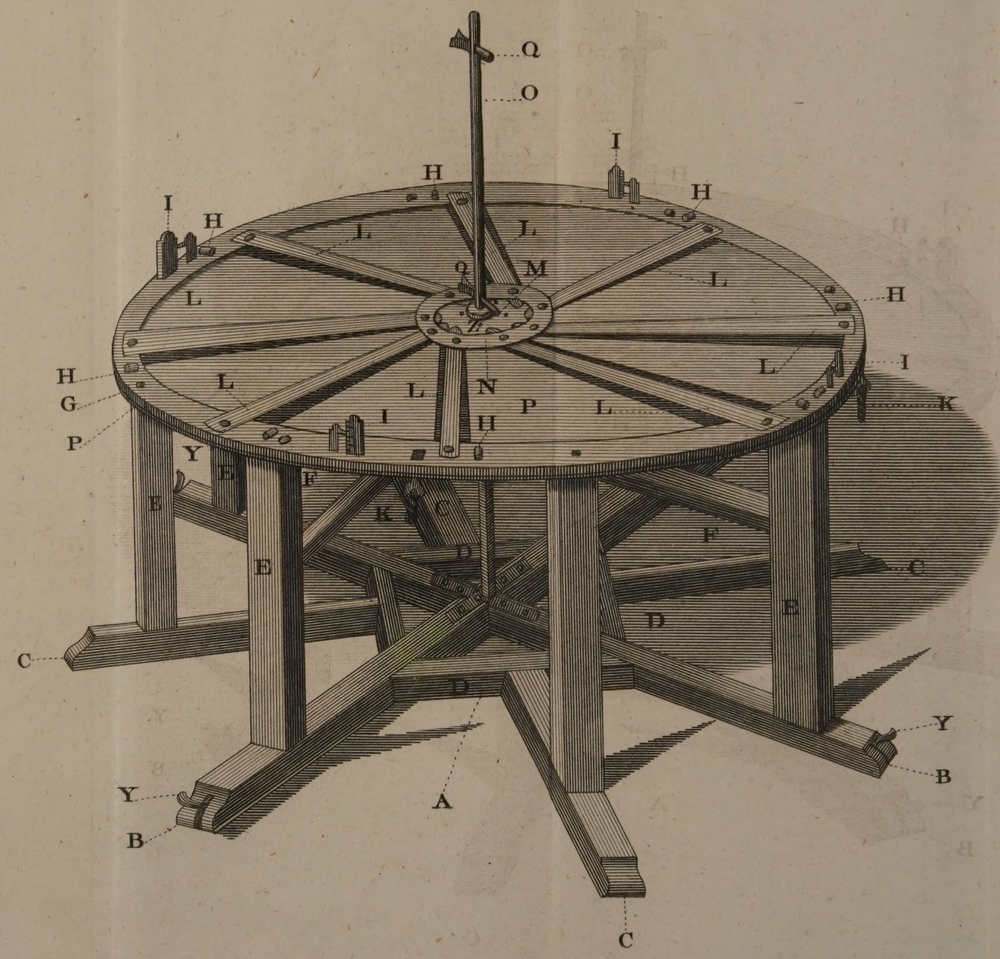
T. Miller sculp.

Fig. 2.d



A. M. Bailey del.

T. Miller sculp

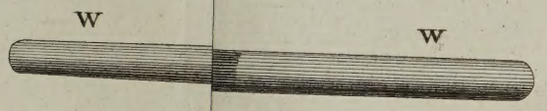
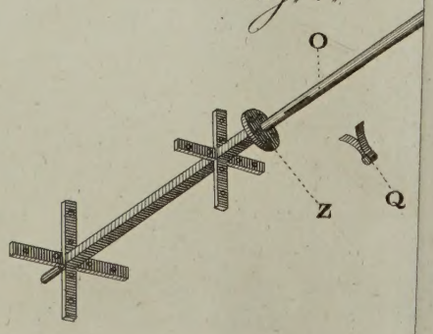


Fig. 4th



A. M. Bailey del.

T. Miller sculp.

Fig. 3.d

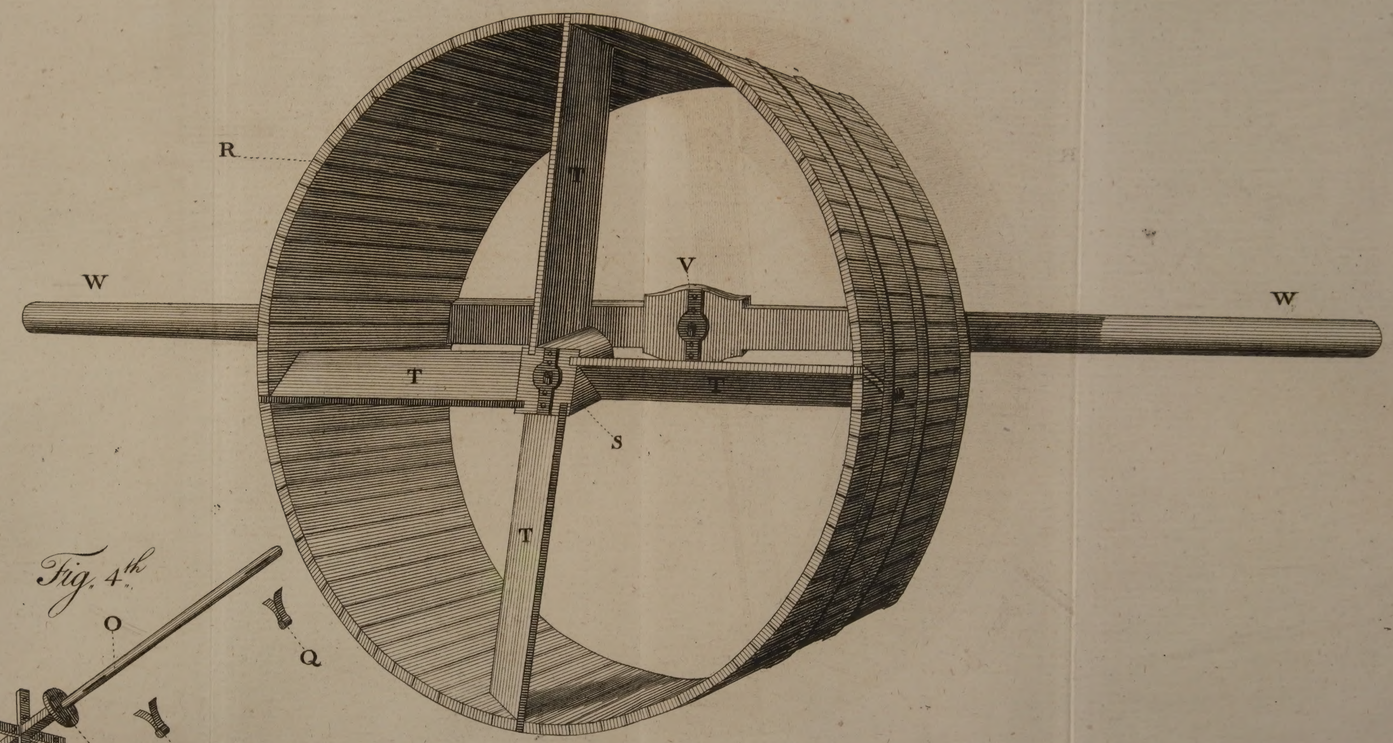
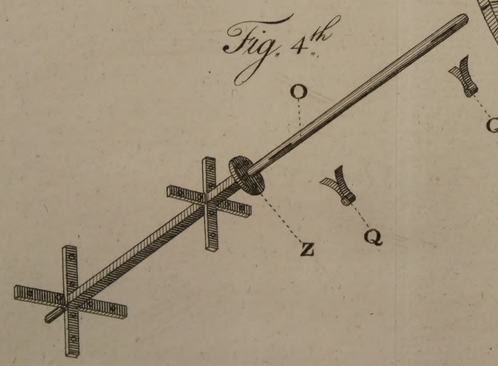


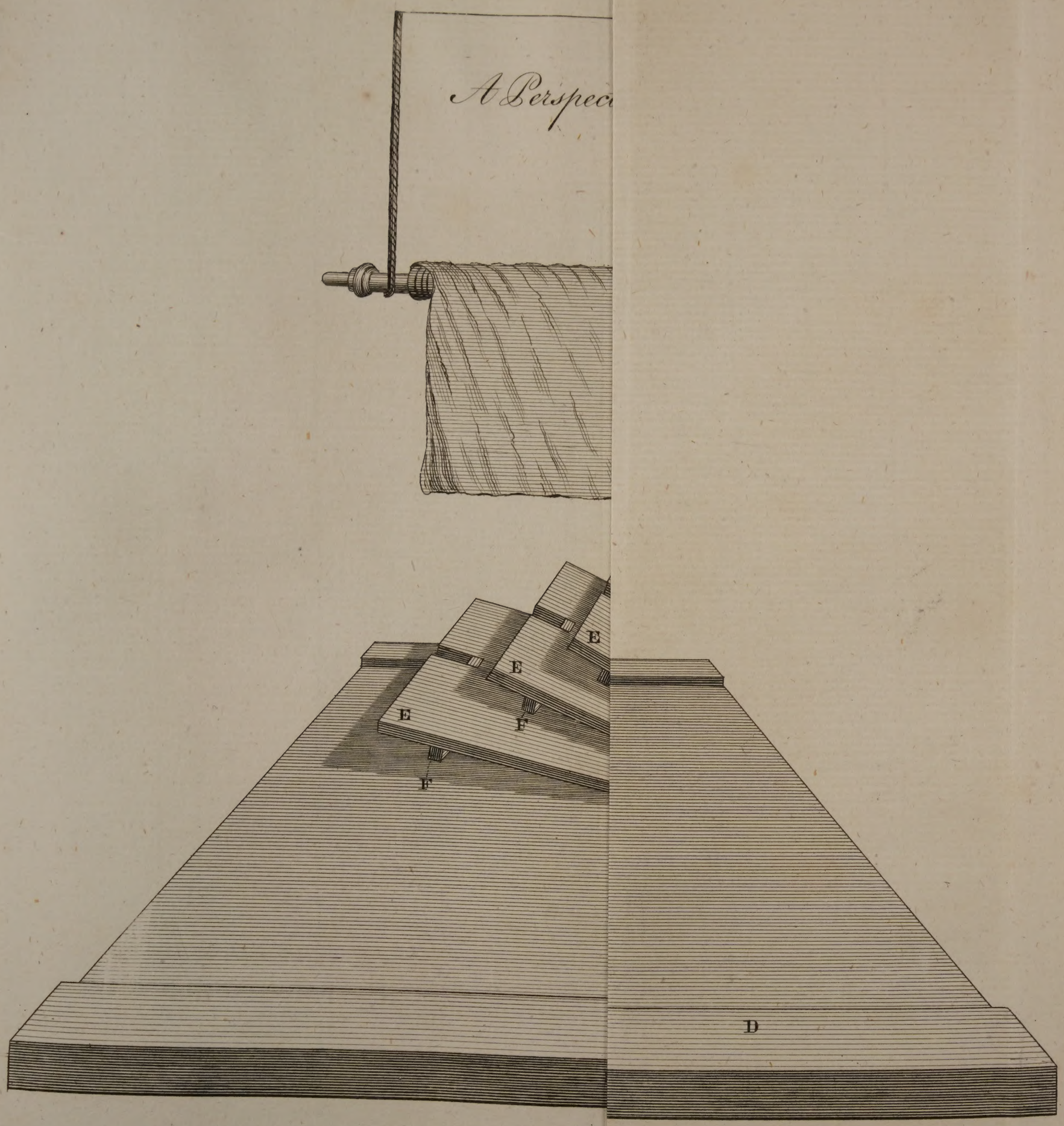
Fig. 4.th



A. M. Bailey del.

T. Miller sculp.

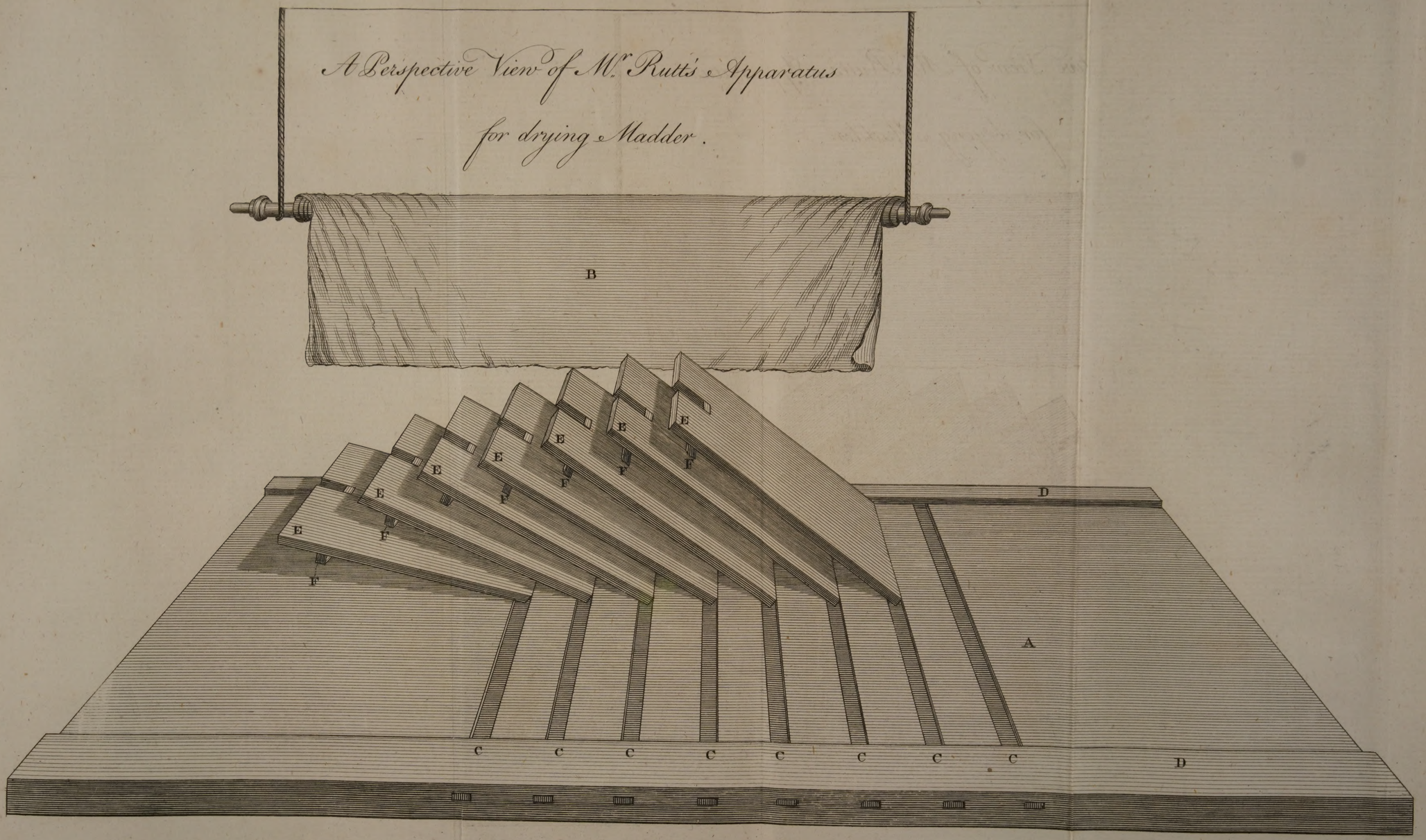
A Perspec



A M Bailey delin.

T. Miller sculp.

A Perspective View of Mr. Rutt's Apparatus for drying Madder.



A M Bailey delin.

T. Miller sculp.

A Perspe

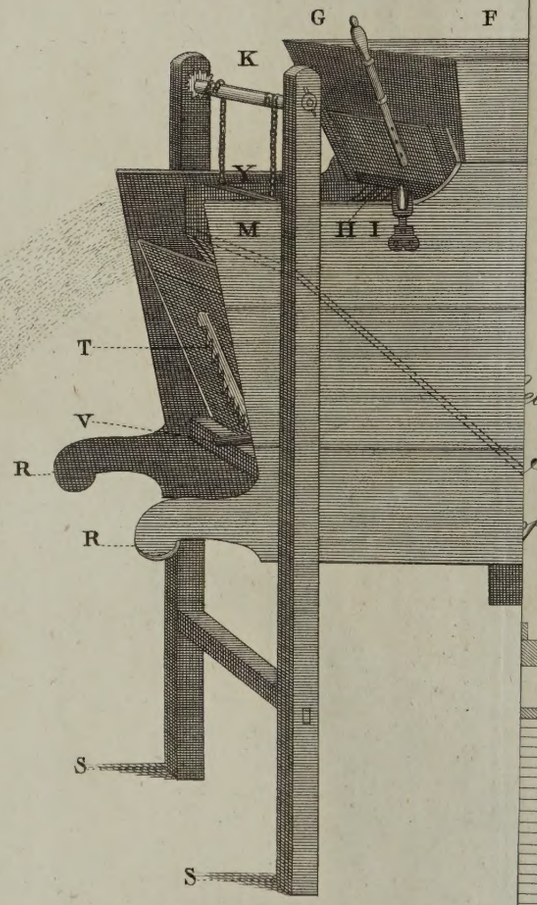
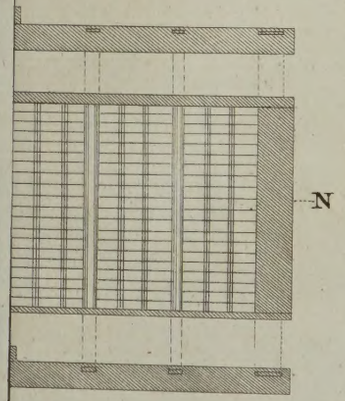


Fig. 2.d

eometrical Plan of the two

Riddles or Screens, with a

f their Sides markd W.W.



Bailey del.

Fougeron Sculp.

A Perspective View of Mr. Evens's Winnowing Machine.

Fig. 1st

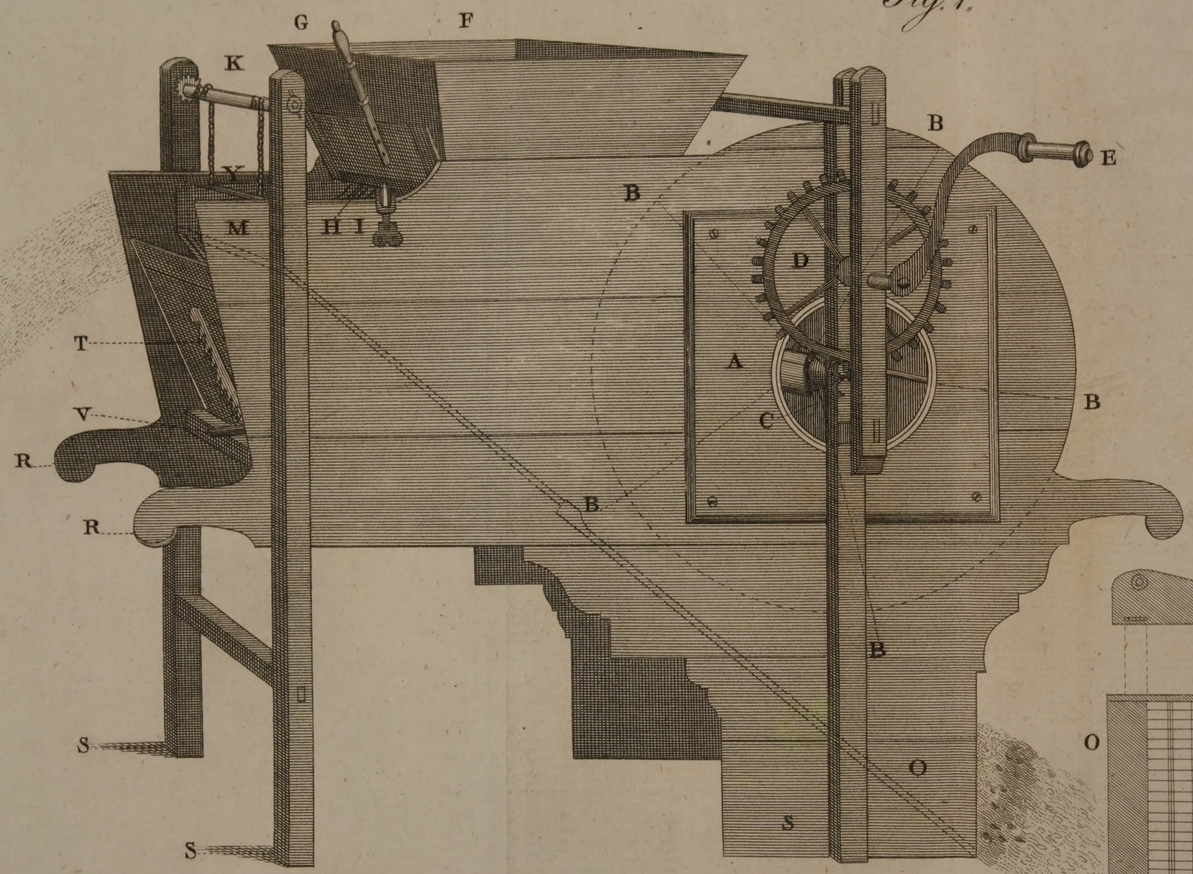
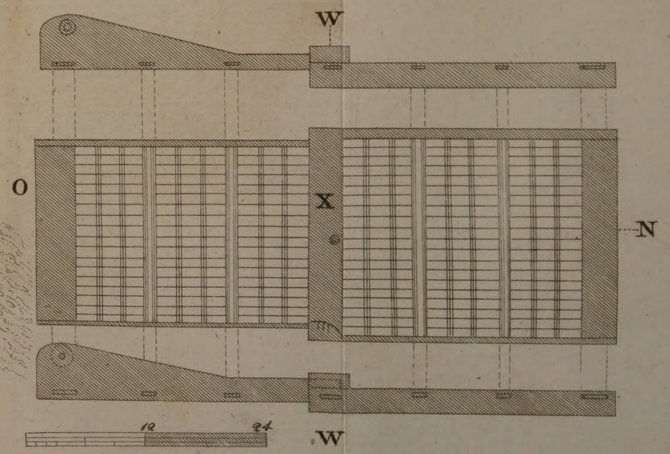


Fig. 2d

A Geometrical Plan of the two under Riddles or Screens, with a Profil of their Sides markd W.W.



Bailey del.

Fougeron Sculp.

A Perspective View of .

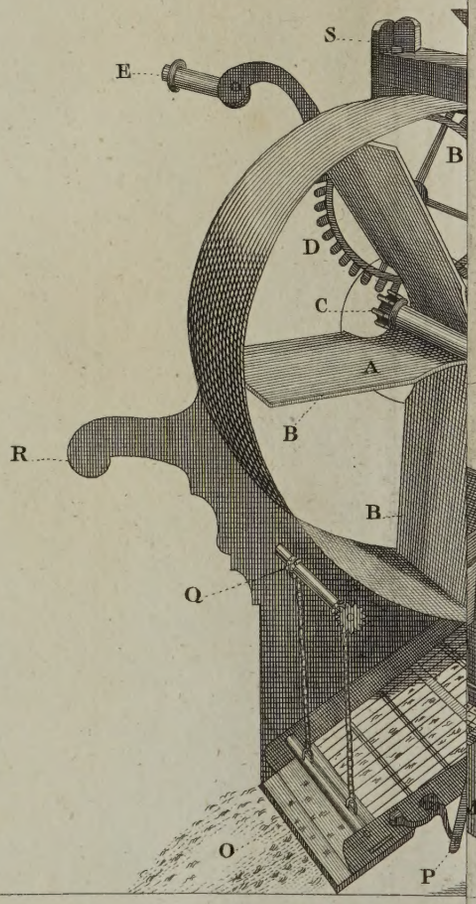


Fig. 4th

Made to a contracted Scale.

Bailey del.

Tougeron Sculp.

A Perspective View of Mr. Evens's winnowing Machine, with it's Sides laid open.

Fig. 3.d

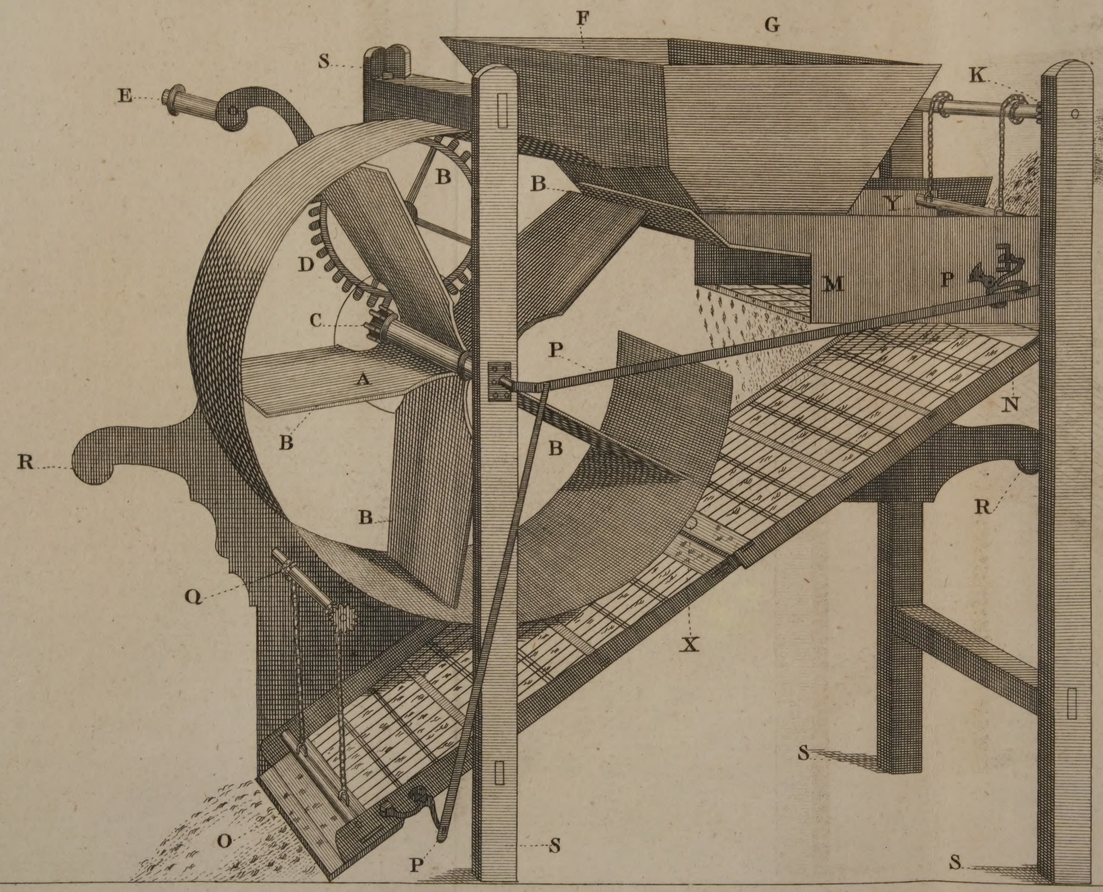
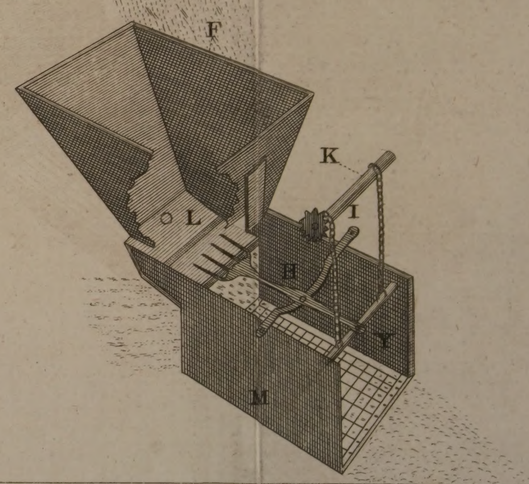


Fig. 4.th

Made to a contracted Scale.

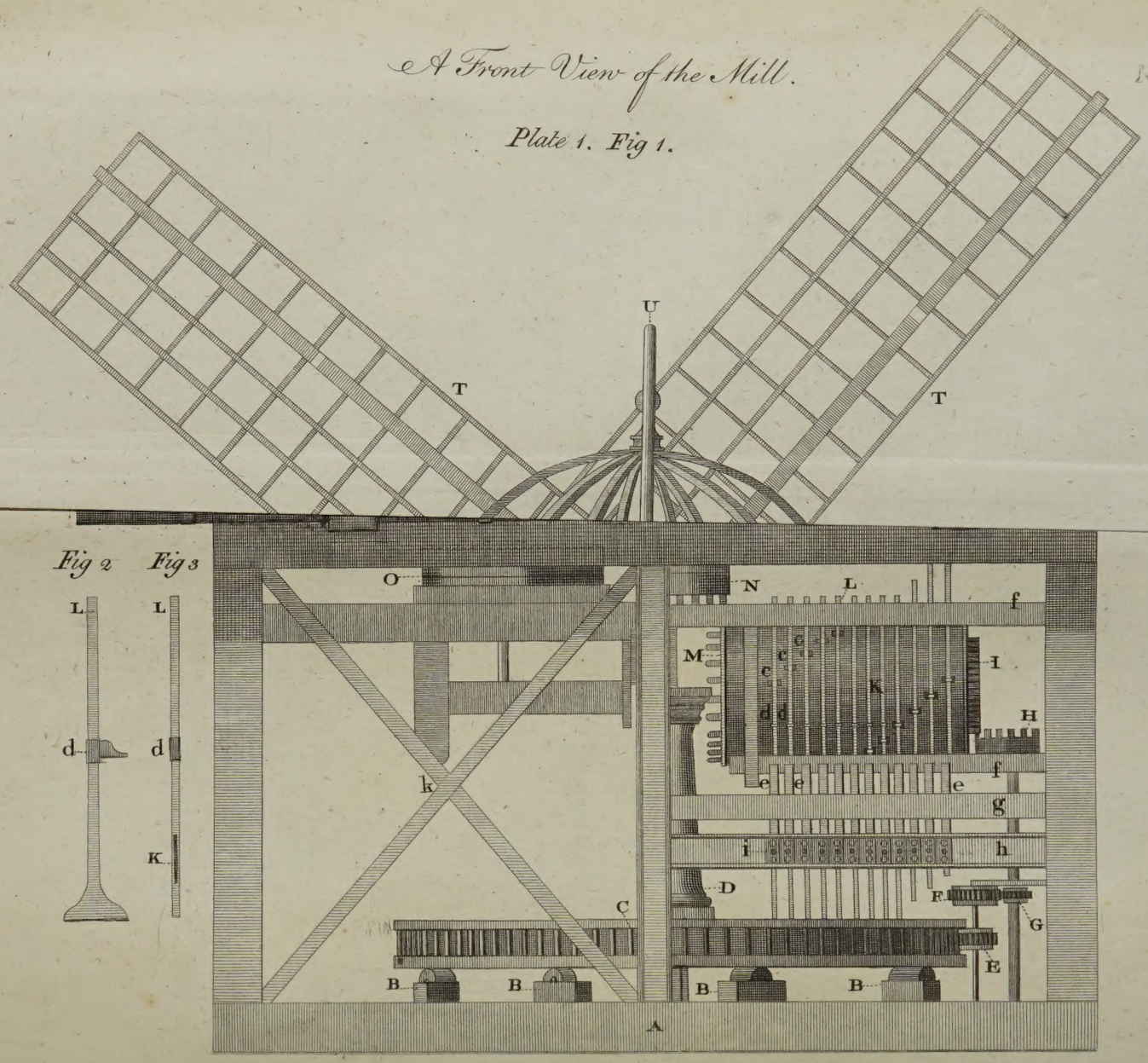


Bailey del.

Dougeron Sculp.

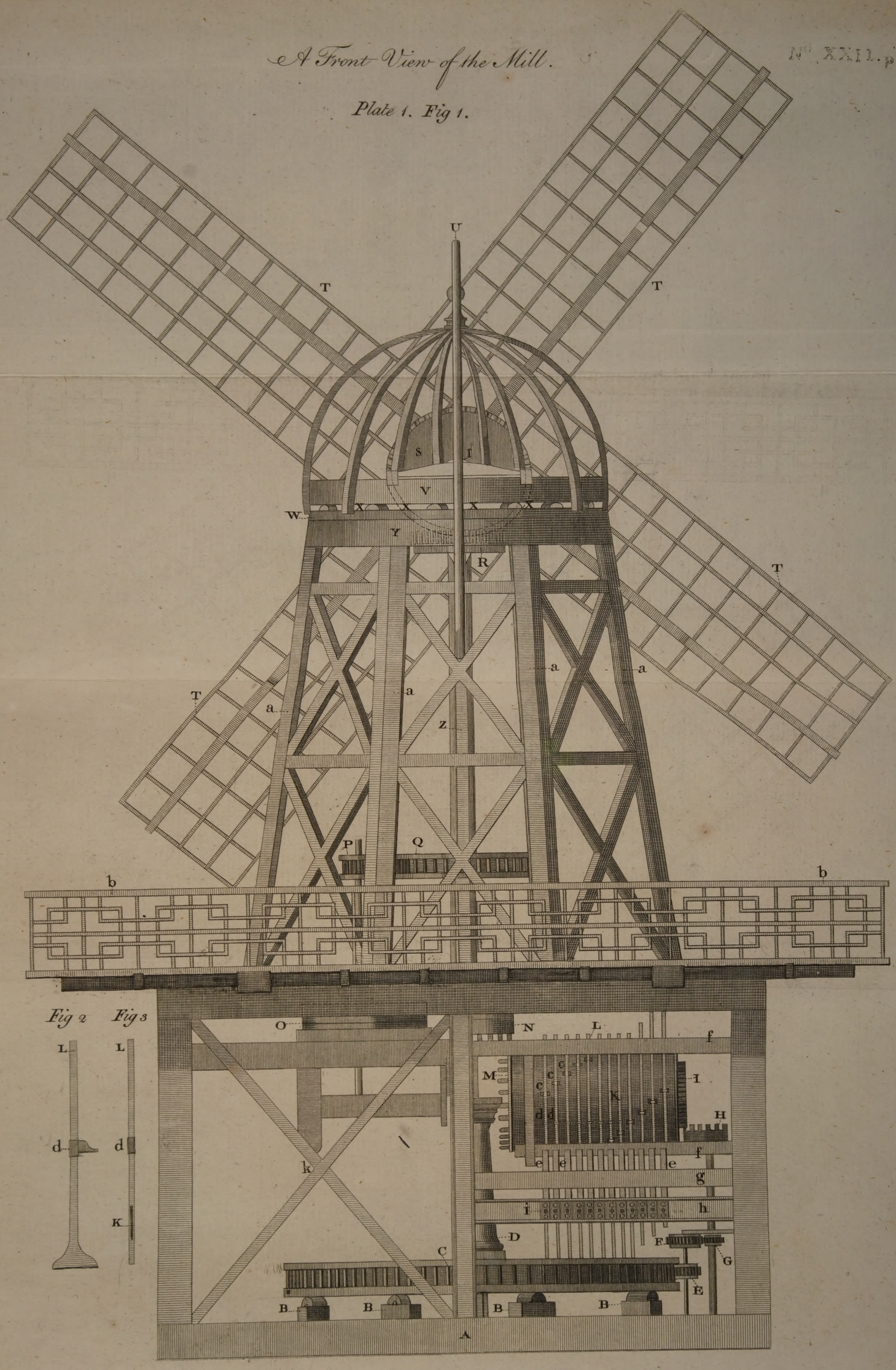
A Front View of the Mill.

Plate 1. Fig 1.



A Front View of the Mill.

Plate 1. Fig 1.



Fougeron sculp

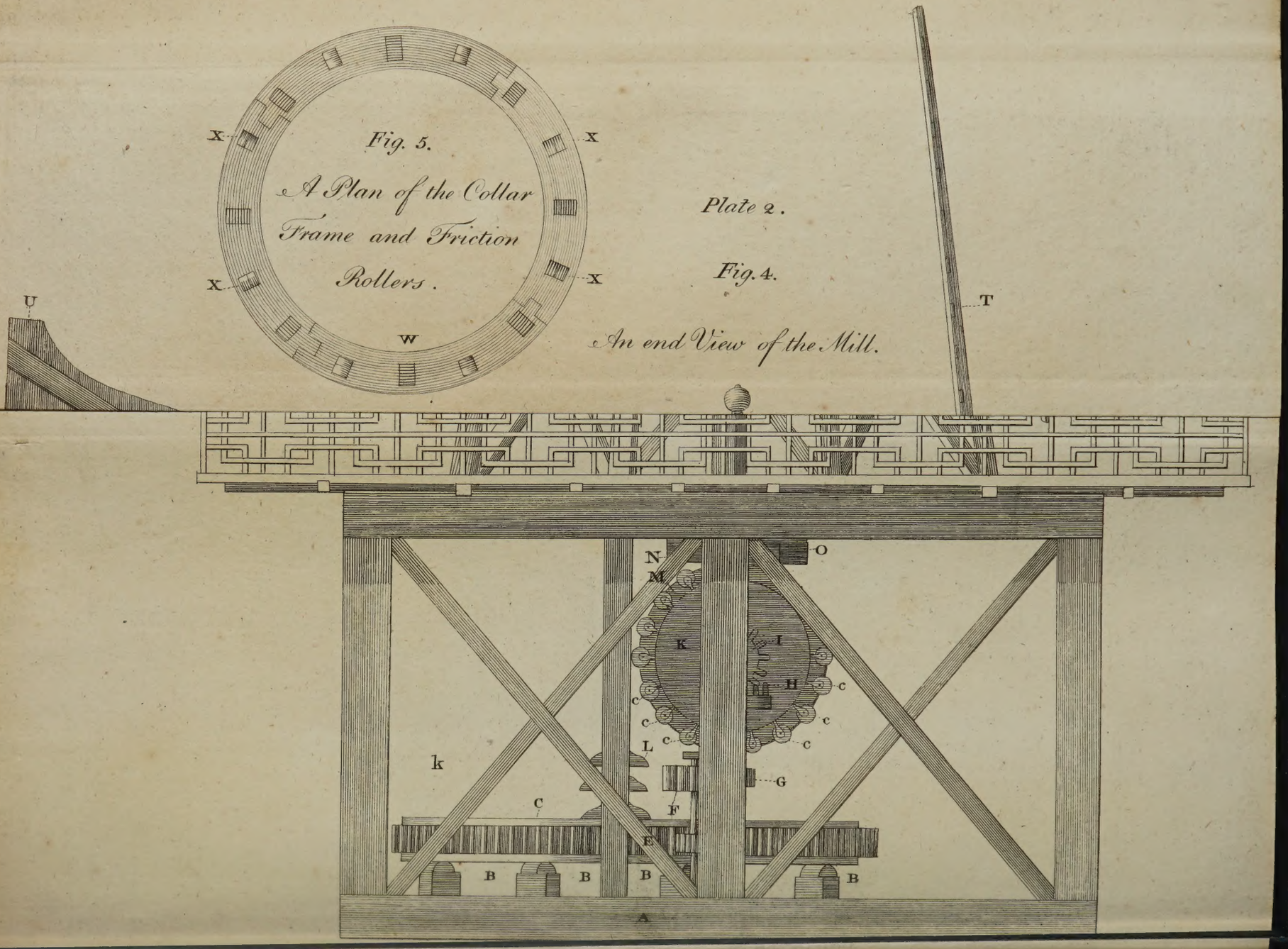
Fig. 5.

A Plan of the Collar Frame and Friction Rollers.

Plate 2.

Fig. 4.

An end View of the Mill.



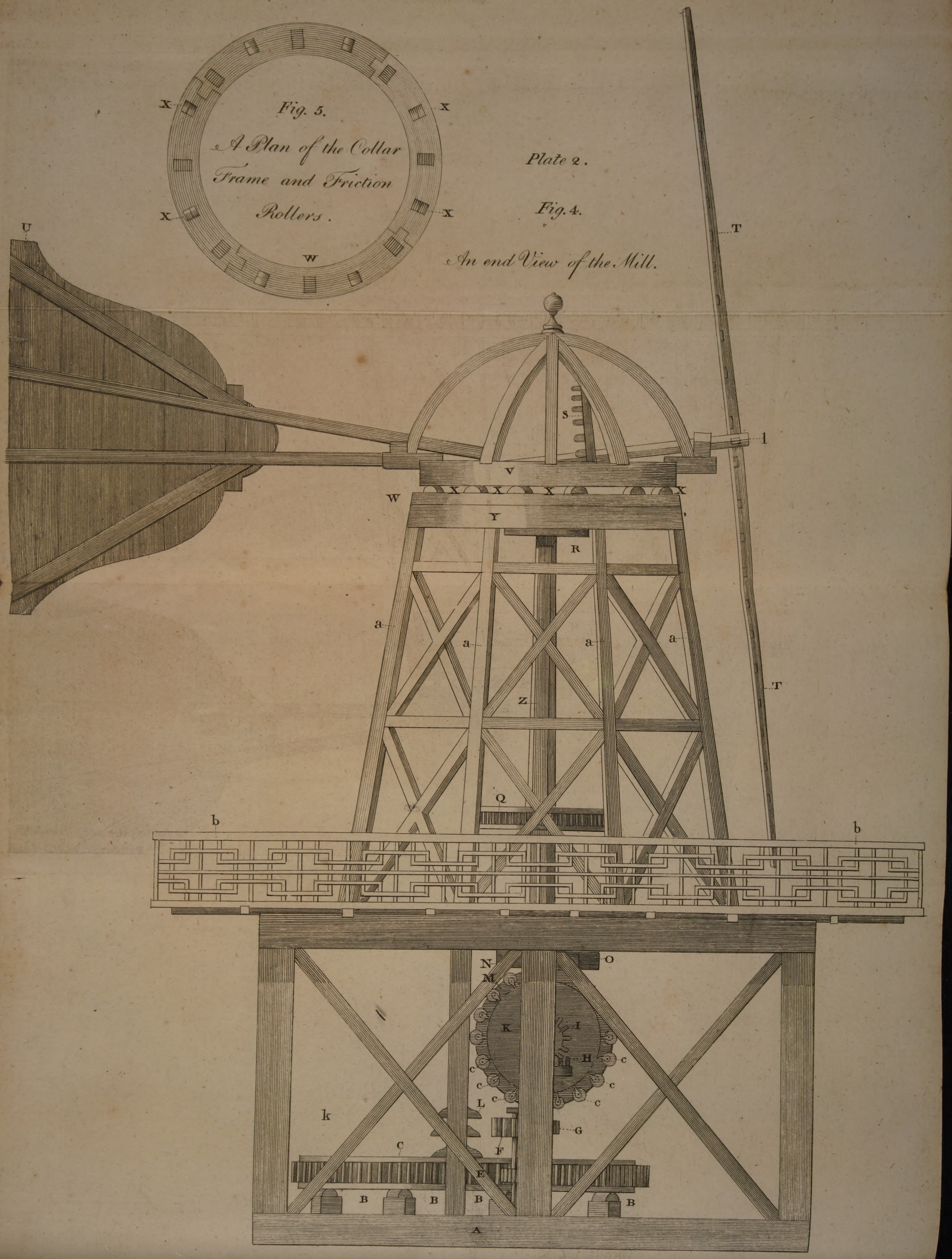


Fig. 5.

A Plan of the Collar Frame and Friction Rollers.

Plate 2.

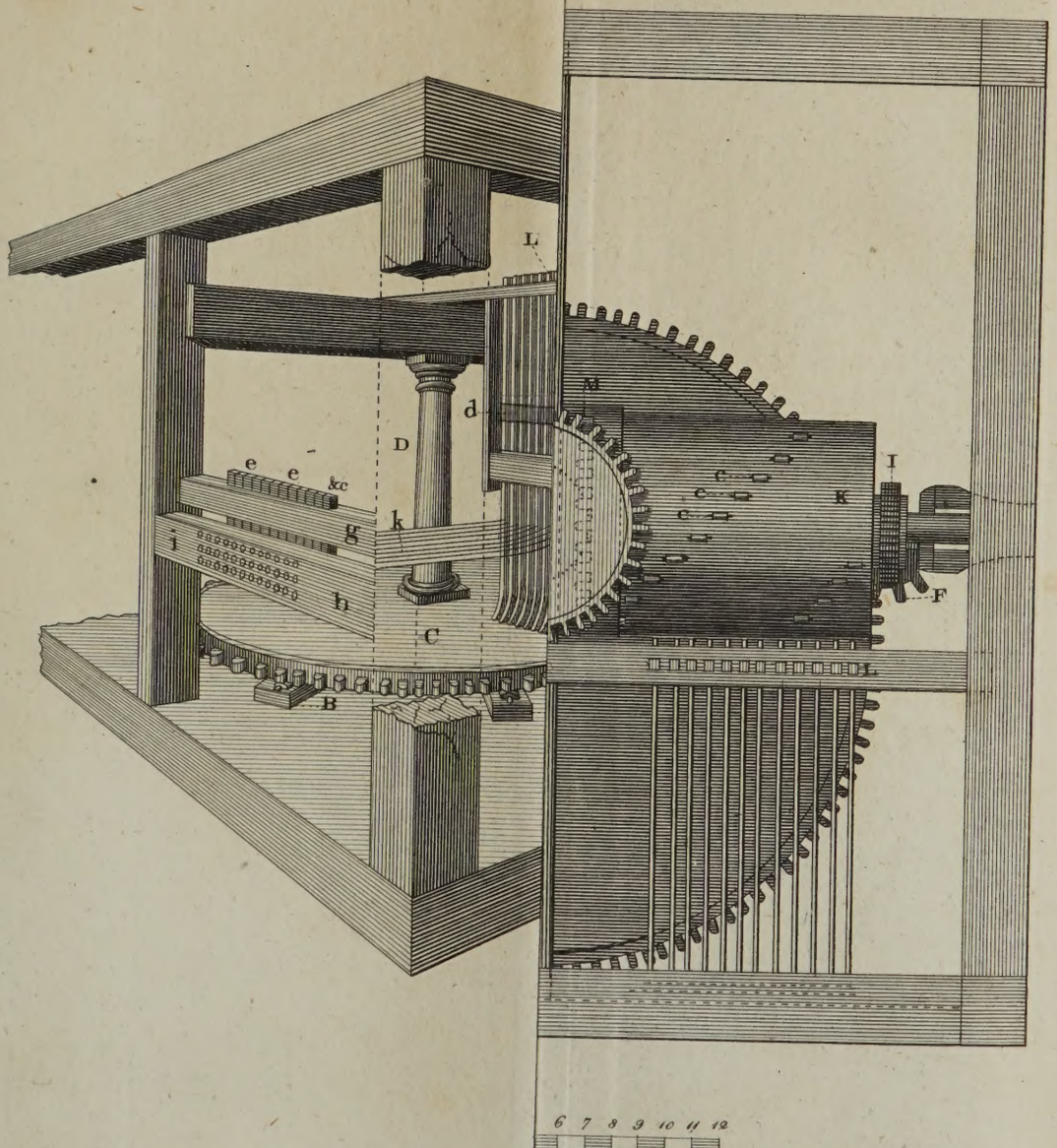
Fig. 4.

An end View of the Mill.

Alex. Mabyn Bailey del.

Fig. 7.

Perspective View of the Threshing Mill.

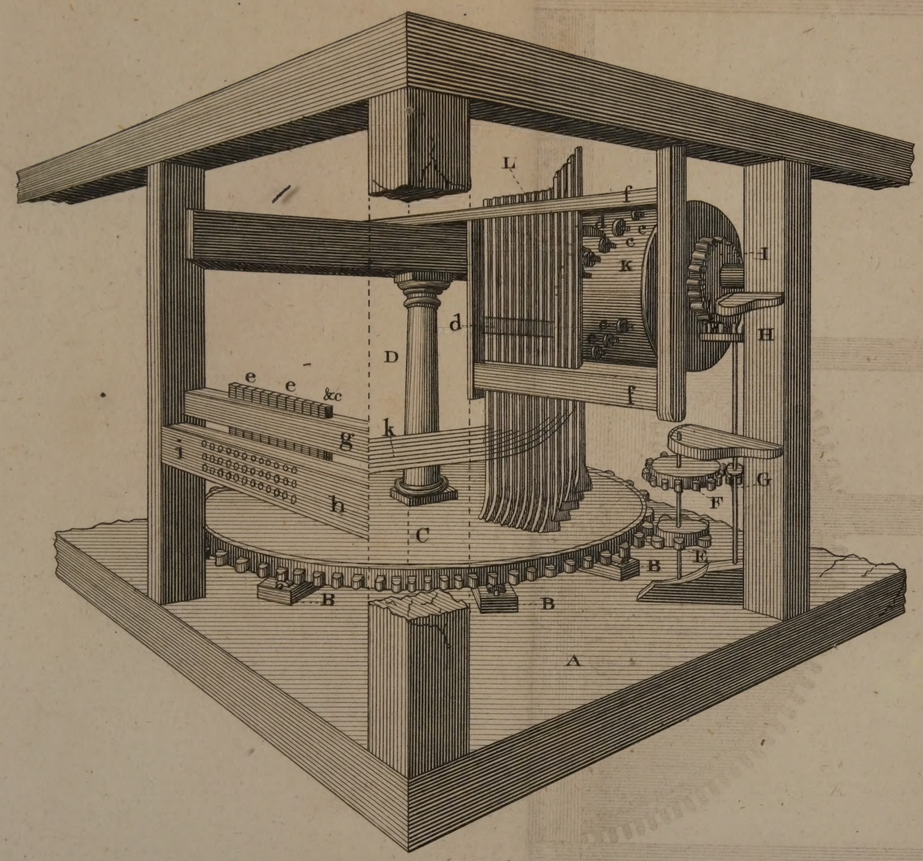


J. Alex. Mabyn Bailey. del.

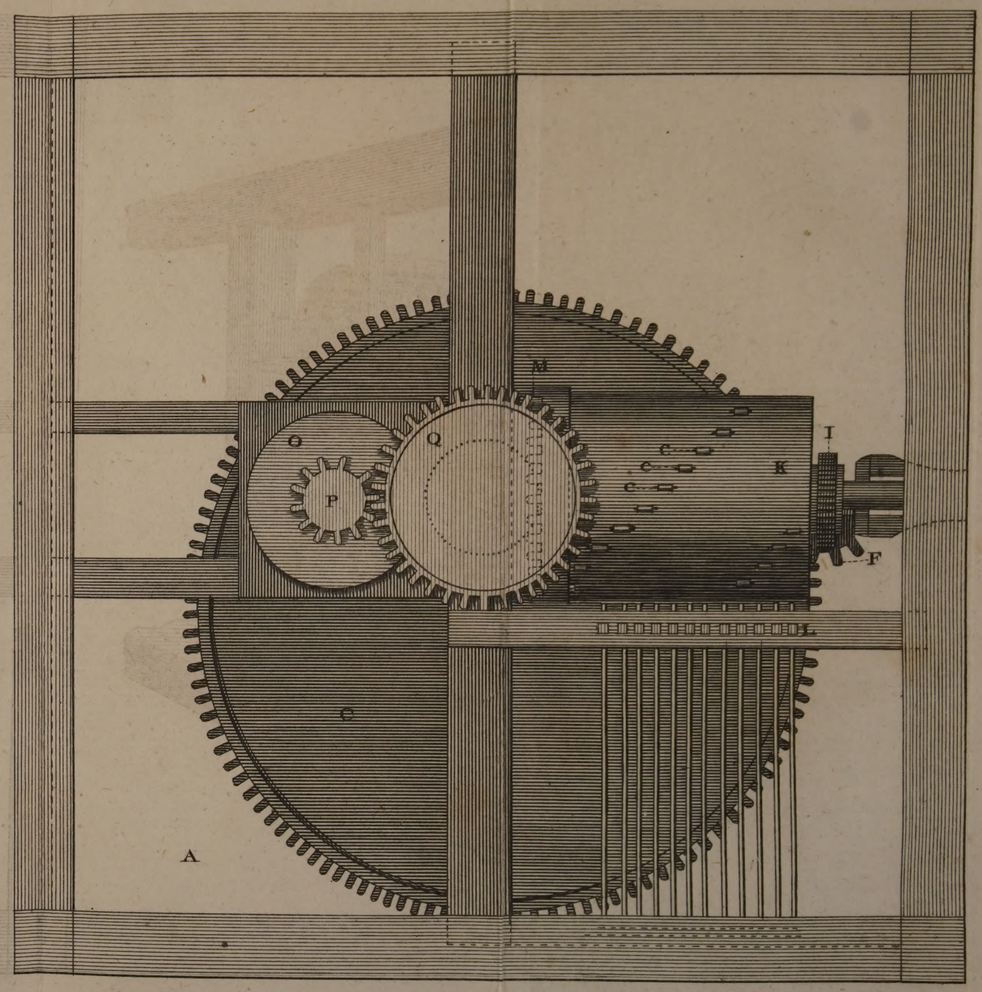
T. Miller sculp.

Fig. 7. Plate 3d. Fig. 6.

Perspective View of the Threshing Floor.



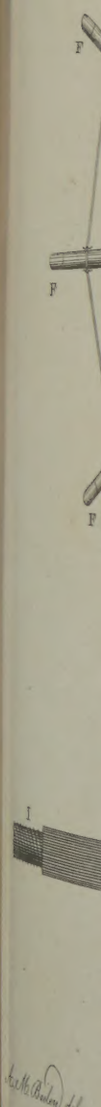
Plan of Mr. Ever's Threshing Mill.



1 2 3 4 5 6 7 8 9 10 11 12

J. Alex.r Malyn Bailey. del.

T. Miller sculp.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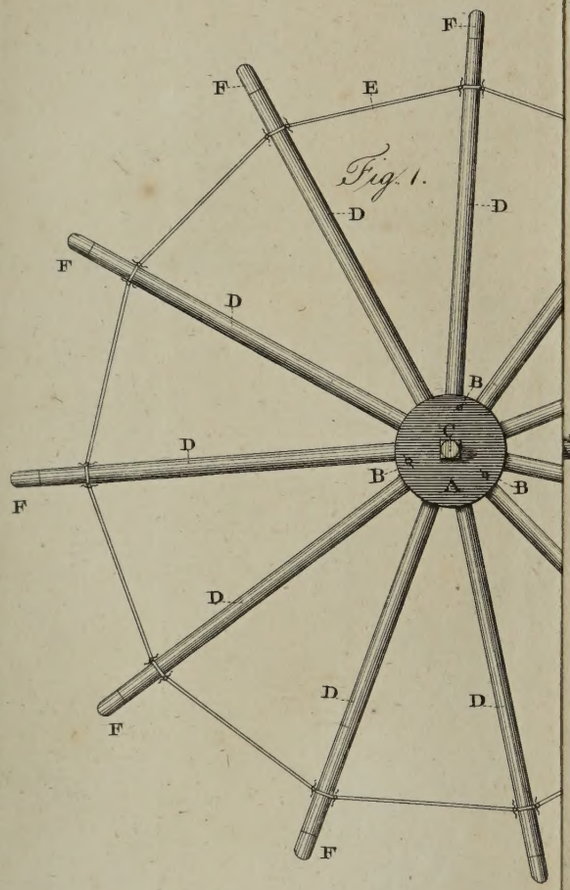


Fig. 1.

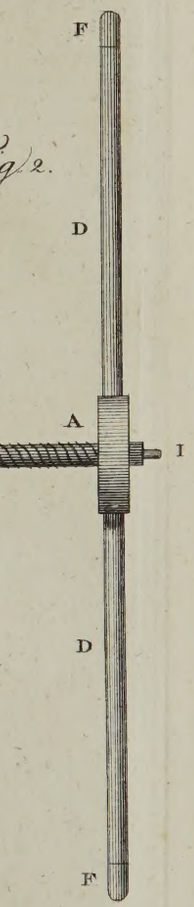


Fig. 2.

A. M. Bailey del.

T. Miller sc

A View of Mr. Edgeworths Perambulator.

Fig. 1.

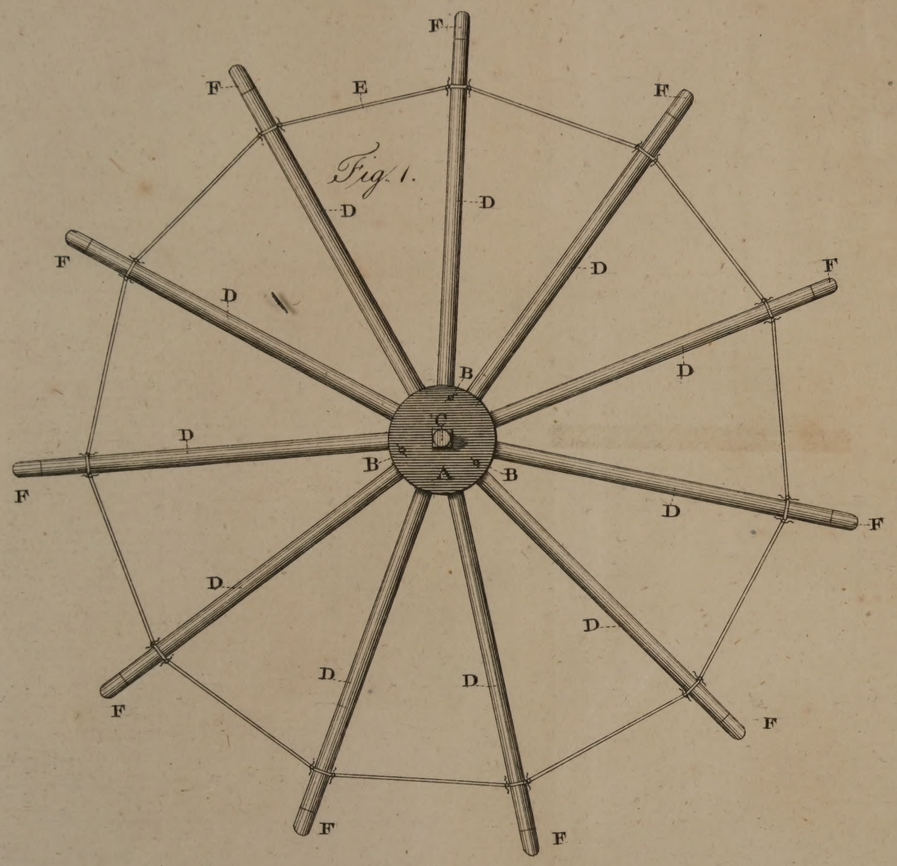


Fig. 2.

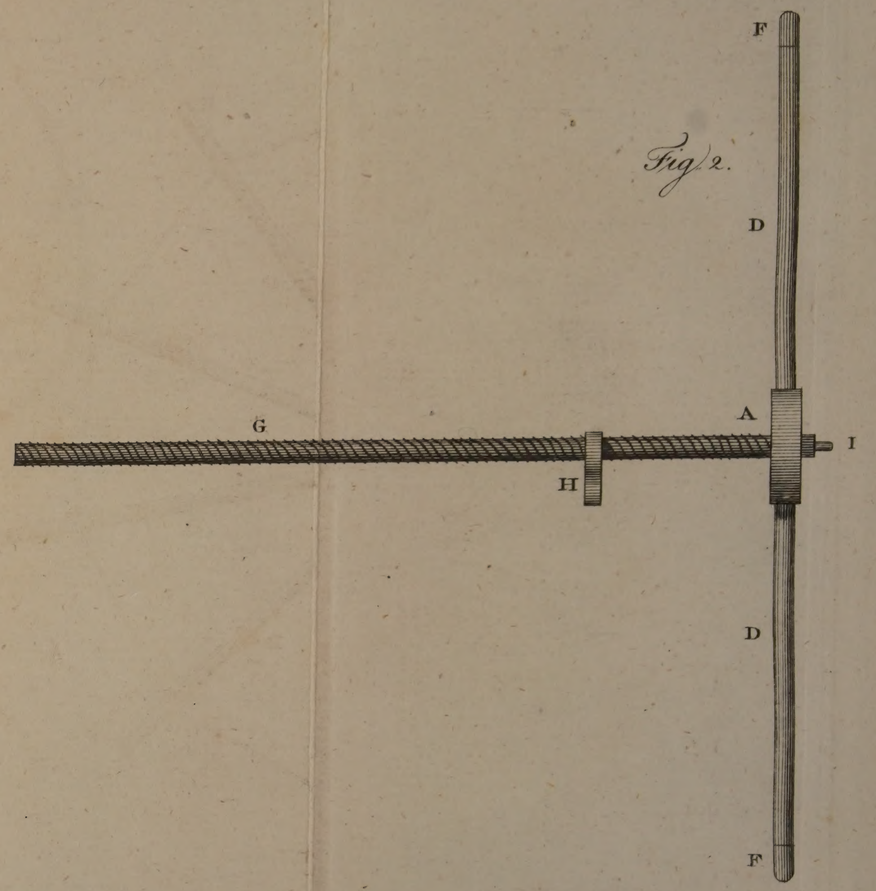
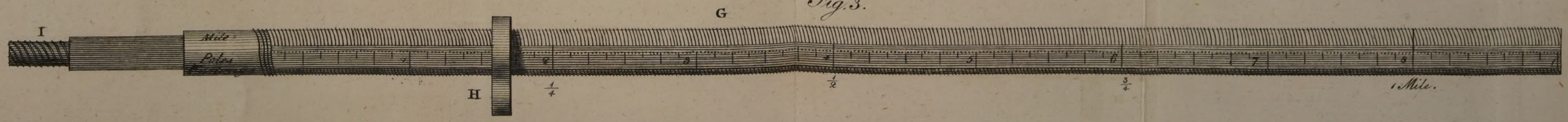


Fig. 3.



A. & M. Bailey del.

T. Miller sc

A Perspe.

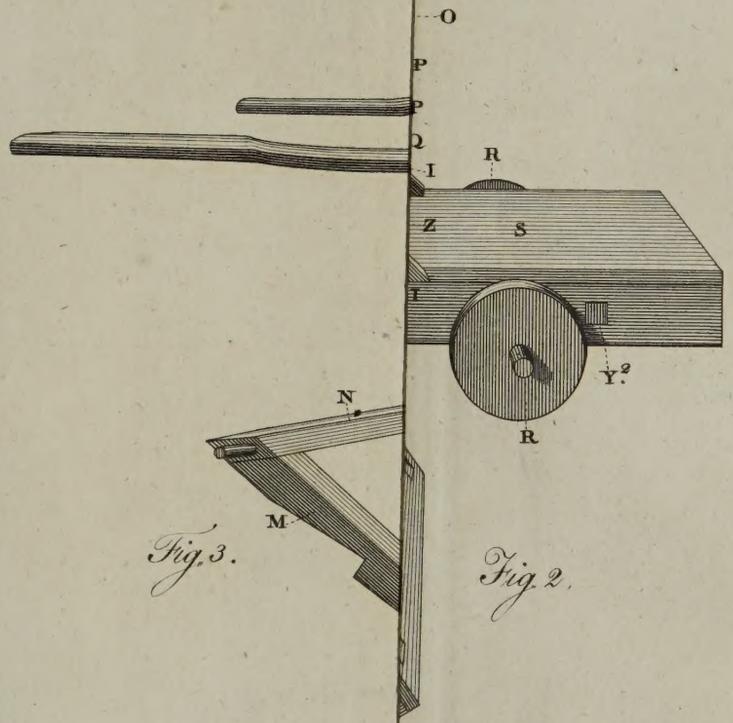


Fig. 3.

Fig. 2.

A Perspective View of Mr. Saverland's Machine for levelling Land.

Fig. 1.

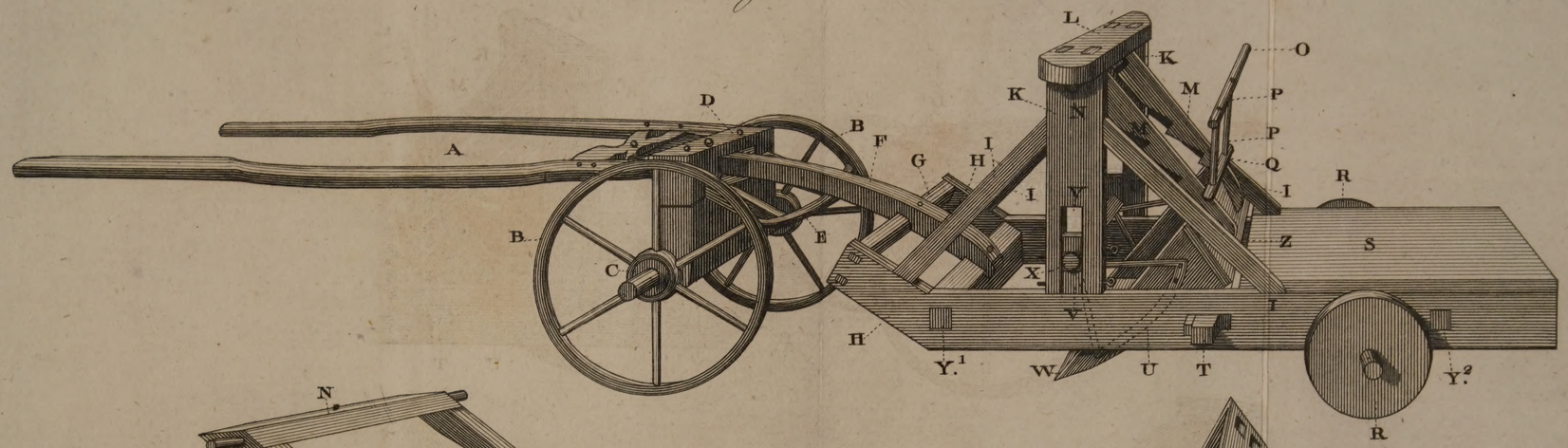


Fig. 3.

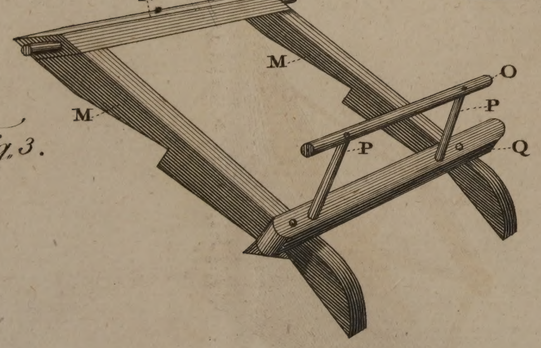
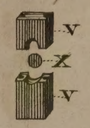


Fig. 4.



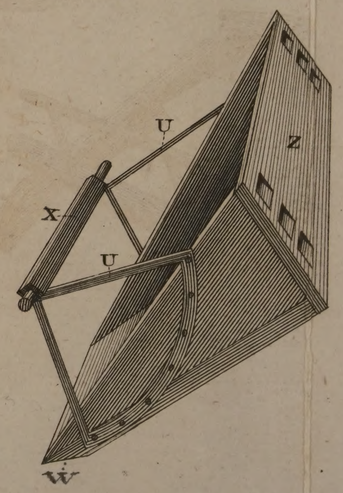


Fig. 2.

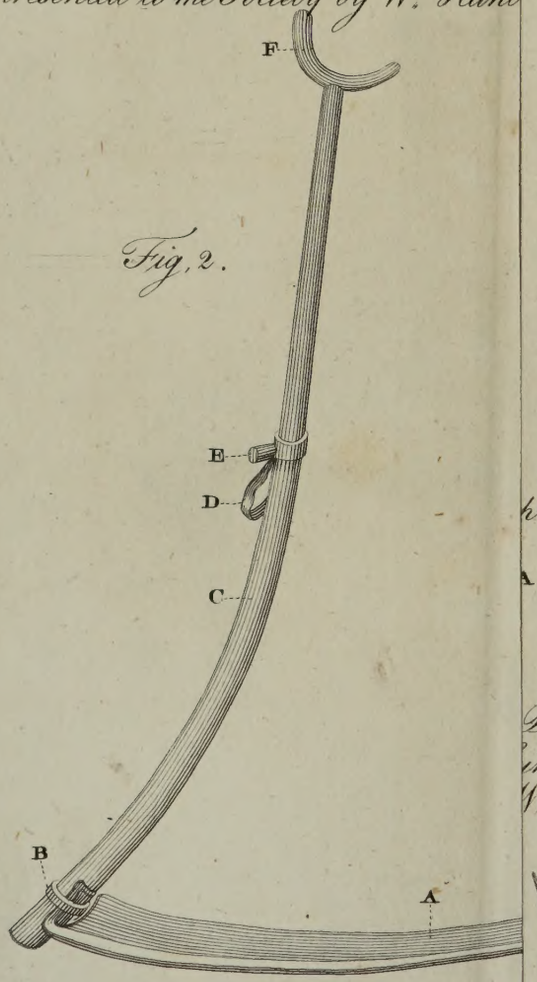
A. M. Bailey del.

T. Miller sc.

A Perspective View of arles Whitworth, V. P.

A Perspective View of a Brabar
presented to the Society by W.m Hant

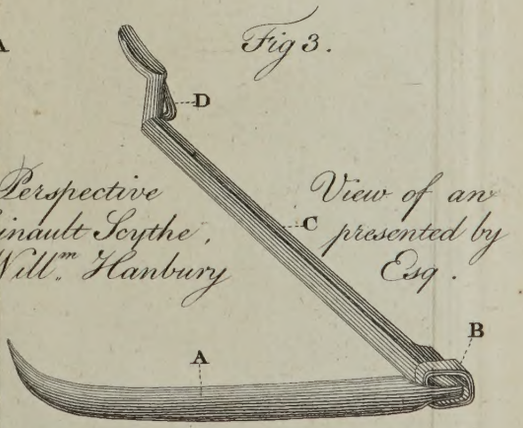
Fig. 2.



h

A

Fig 3.



Perspective
inault Scythe,
Will.m Hanbury

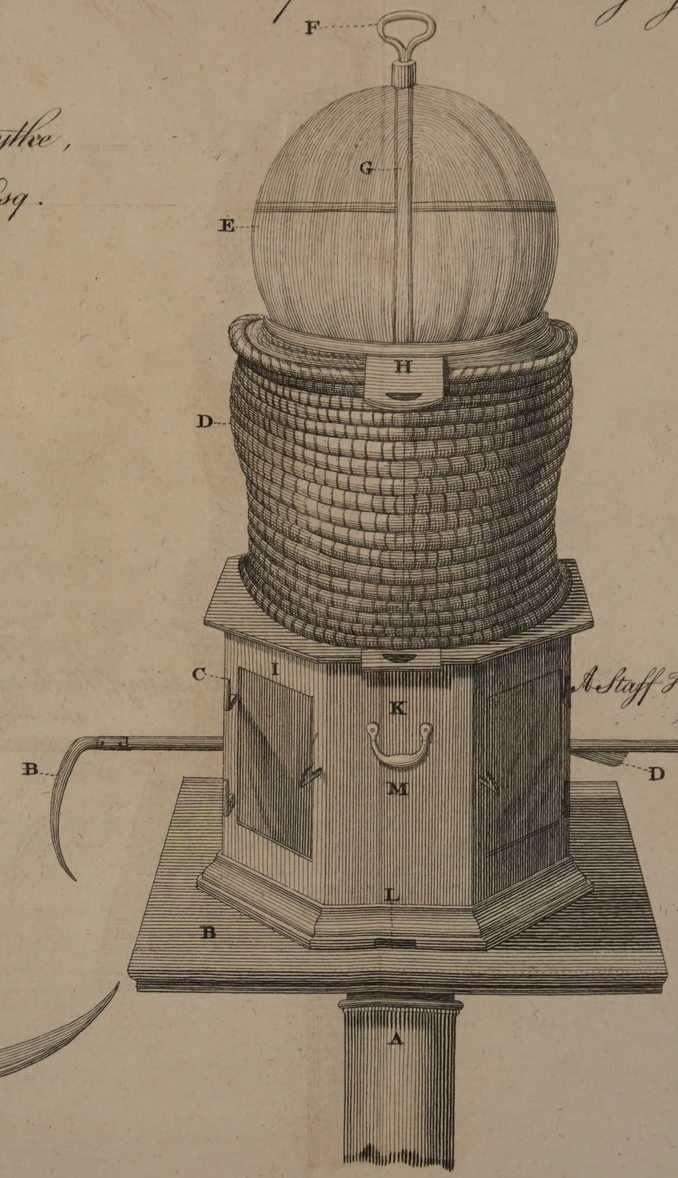
View of an
presented by
Esq.

A. M. Bailey del.

Jn.o Vitalba sc.

Fig. 1.

A Perspective View of a Pyramidical Bee Hive, presented to the Society by Sir Charles Whitworth, V. P.



A Perspective View of a Brabant Scythe, presented to the Society by Wm. Hanbury Esq.

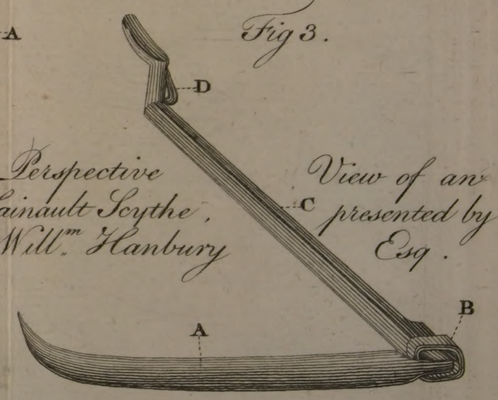
Fig. 2.

Fig. 4.

A Staff Hook used with the Scythes

Fig 3.

A Perspective View of an Hainault Scythe, presented by Will.m Hanbury Esq.

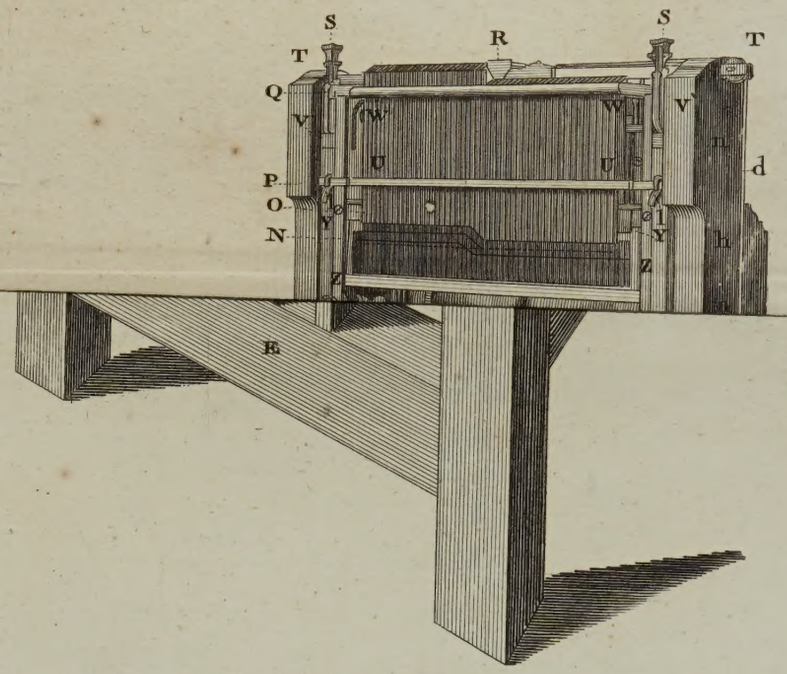


A. M. Bailey del.

J.n.e Vitalba sc.

A Perspective View of Mr. Unwin's Stocking Frame.

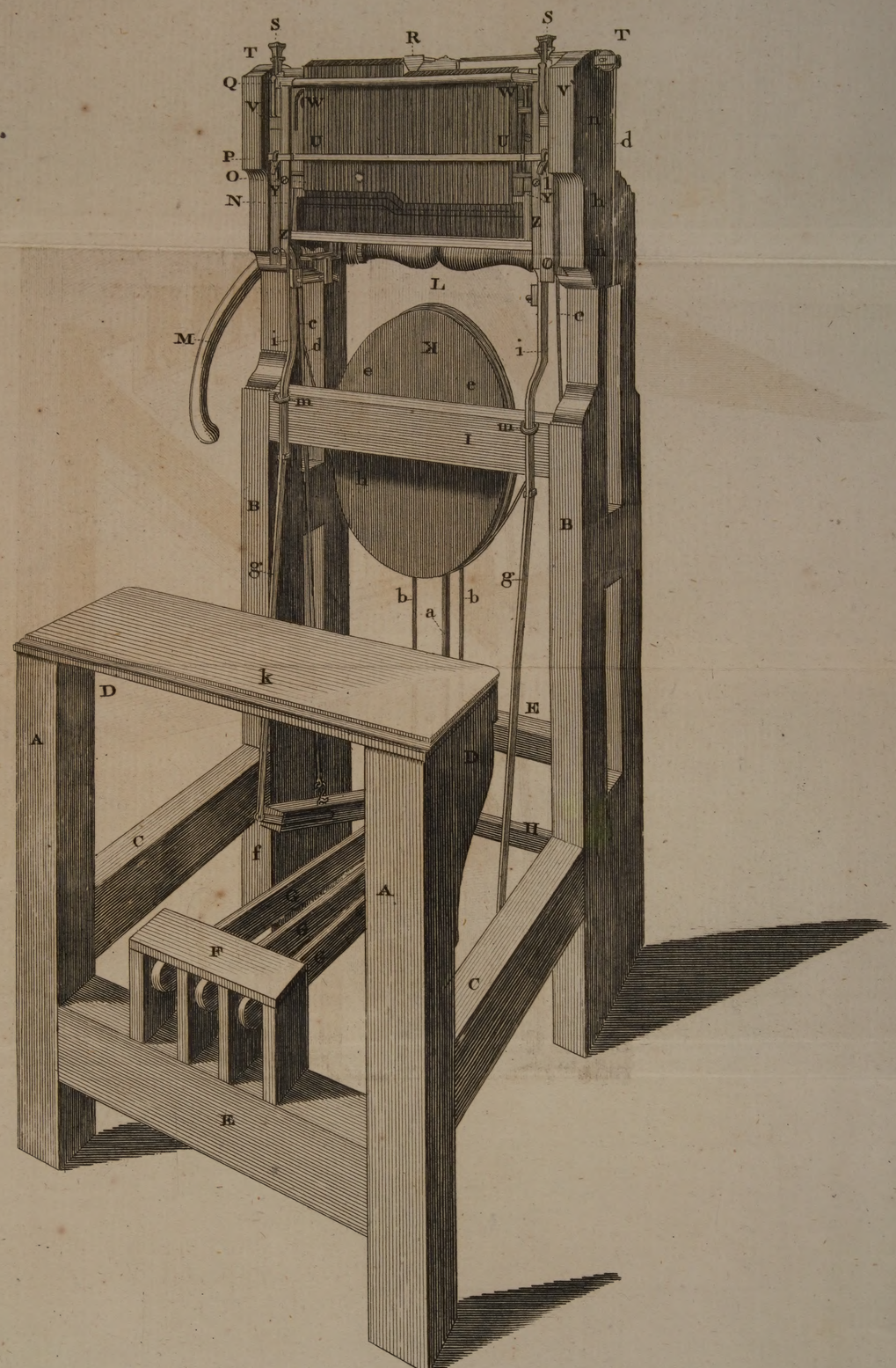
Plate 1. *Fig. 1.*



J. Caldwall sculp.

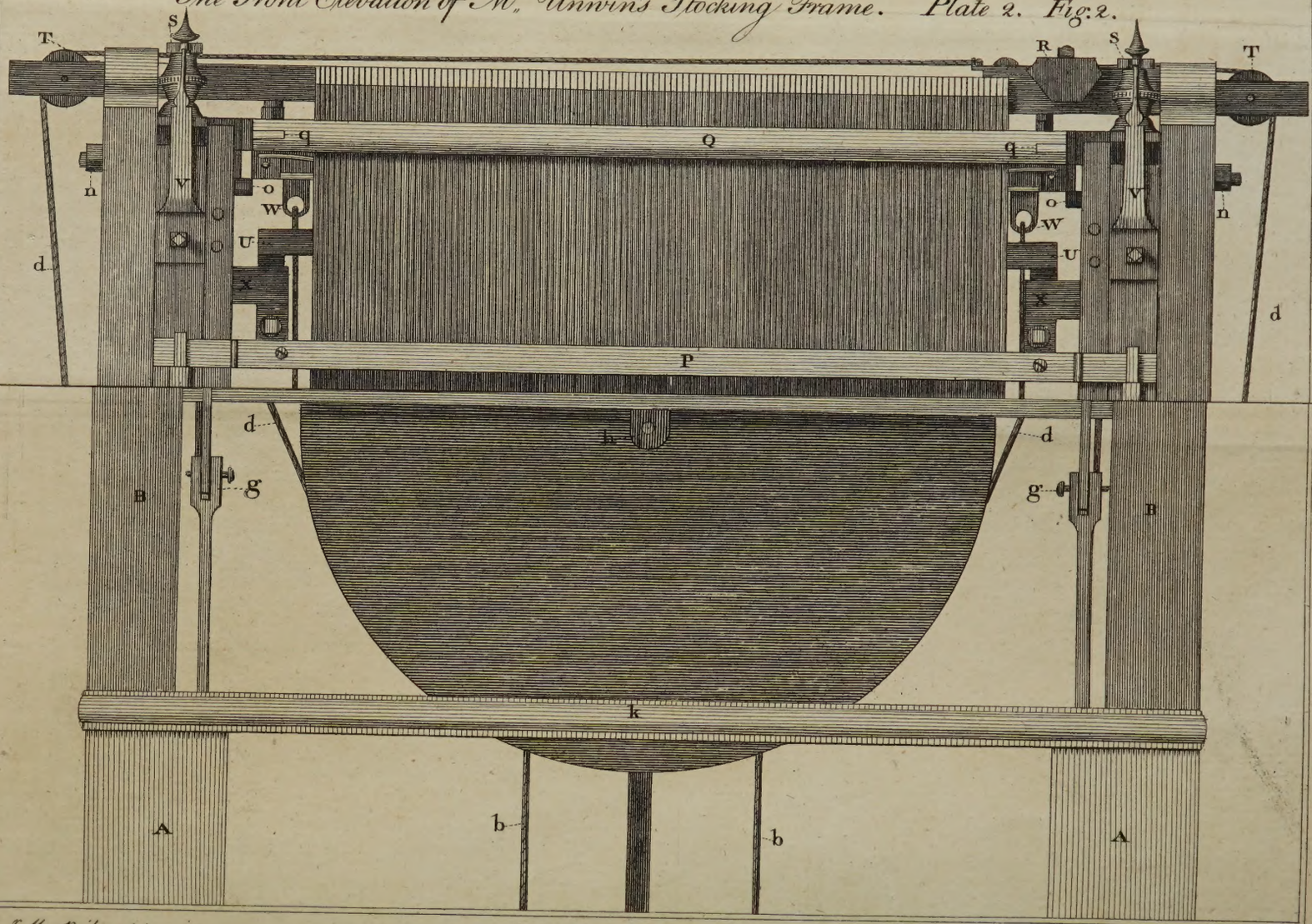
A Perspective View of Mr. Unwin's Stocking Frame.

Plate 1. Fig. 1.



J. Caldwall sculp.

The Front Elevation of Mr. Unwin's Stocking Frame. *Plate 2. Fig. 2.*

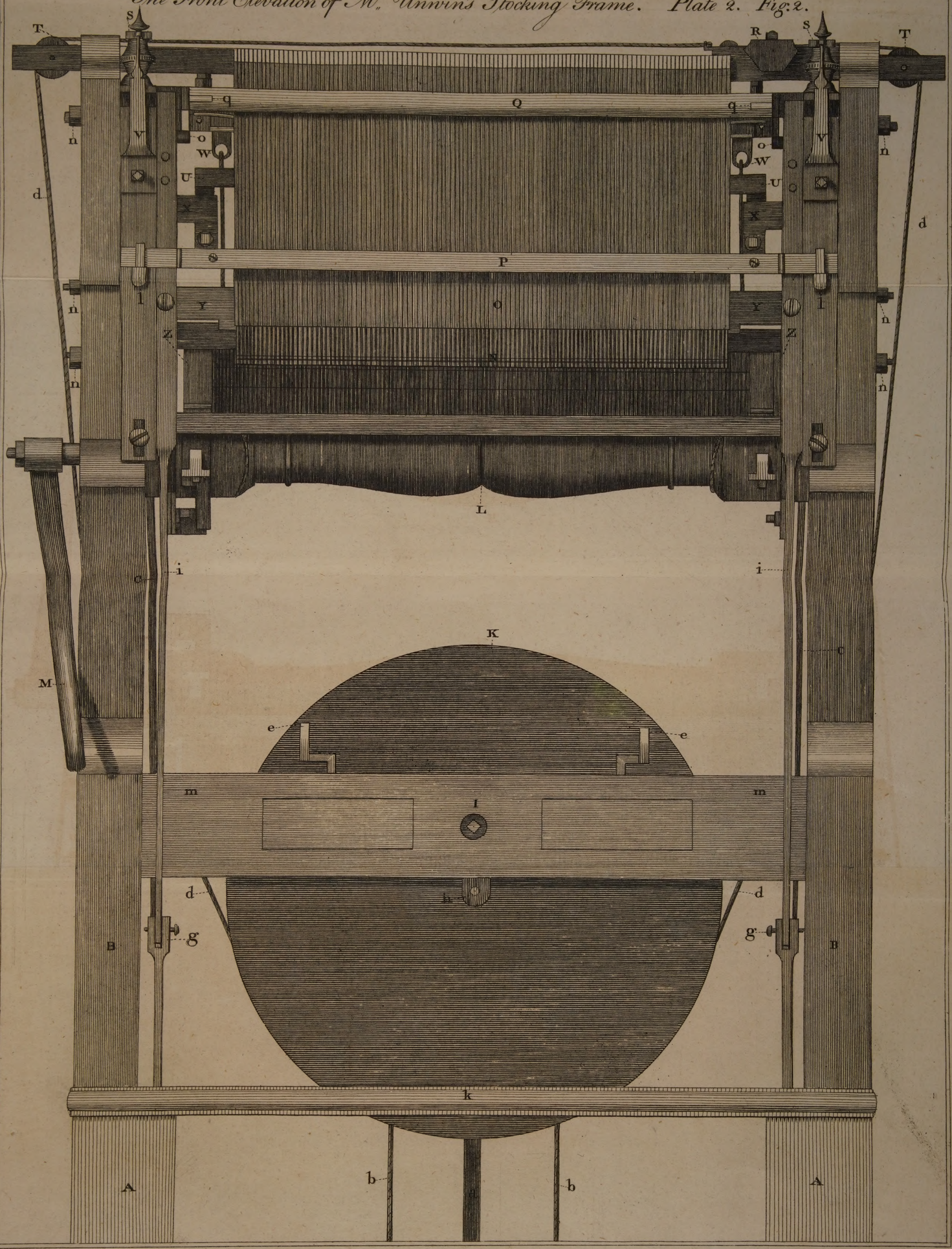


Mea.r M. Bailey del.

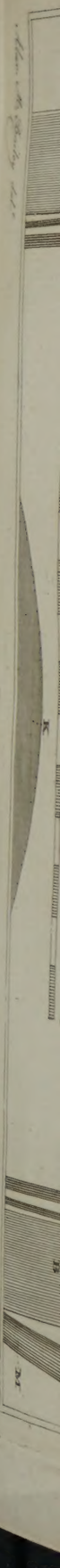
Scale of 4 Inches to a Foot.

I. Caldwall. sculp.t

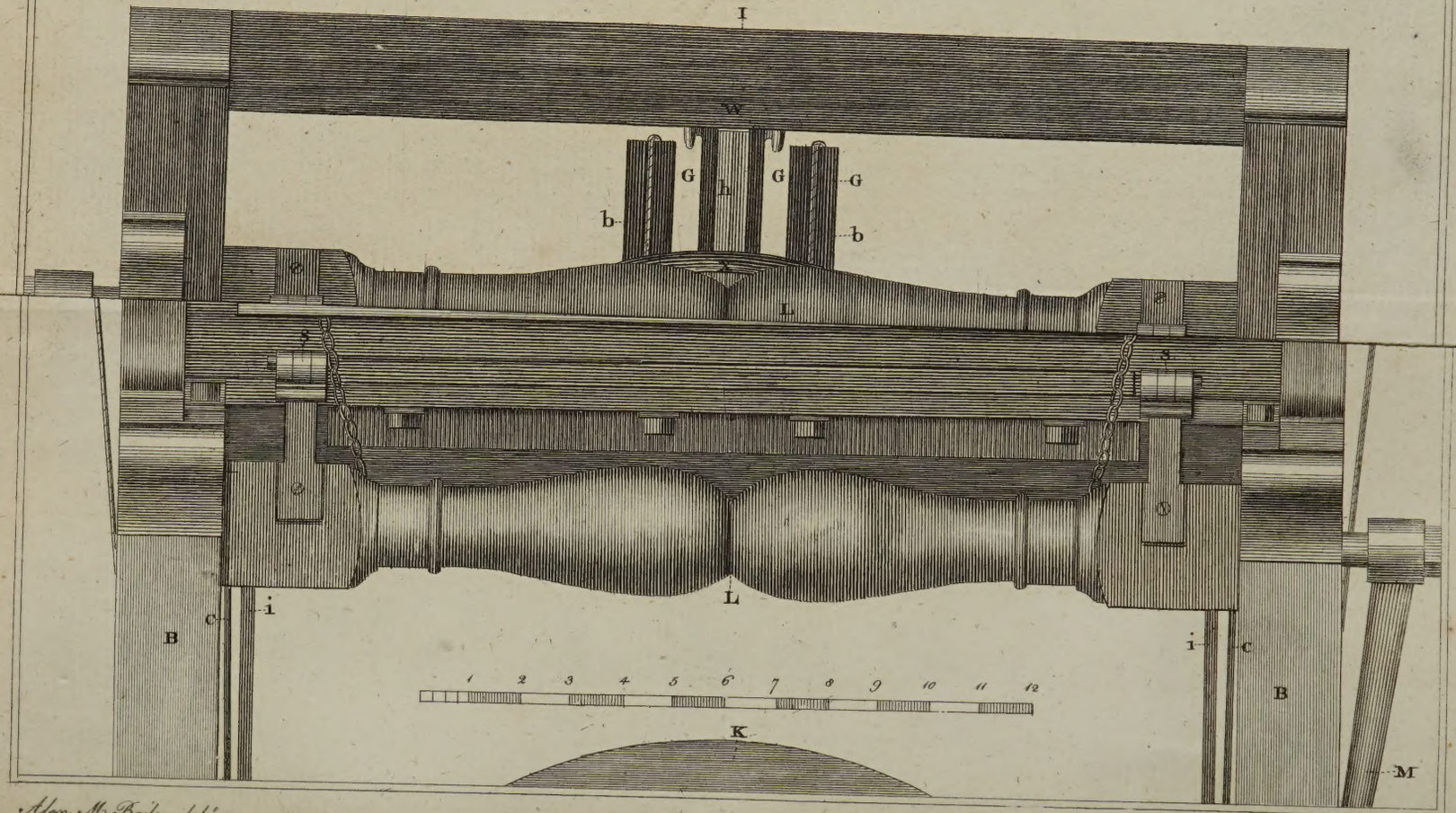
The Front Elevation of Mr. Unnvin's Stocking Frame. *Plate 2. Fig. 2.*



Mrs. M. Bailey del. *Scale of 4 Inches to a Foot.* *T. Caldwall sculpt.*



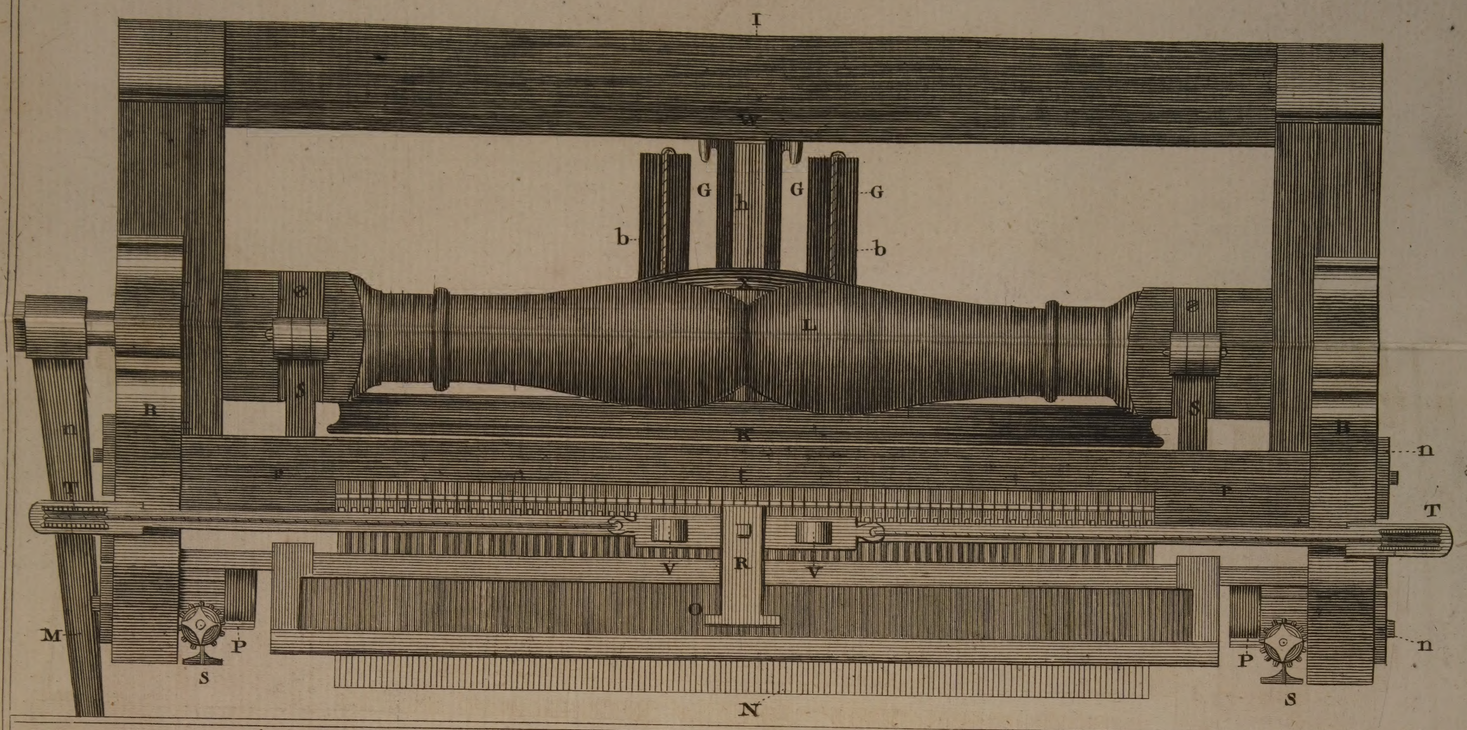
A Plan of Mr. Unwin's Stocking Frame. Plate 3. Fig. 4.



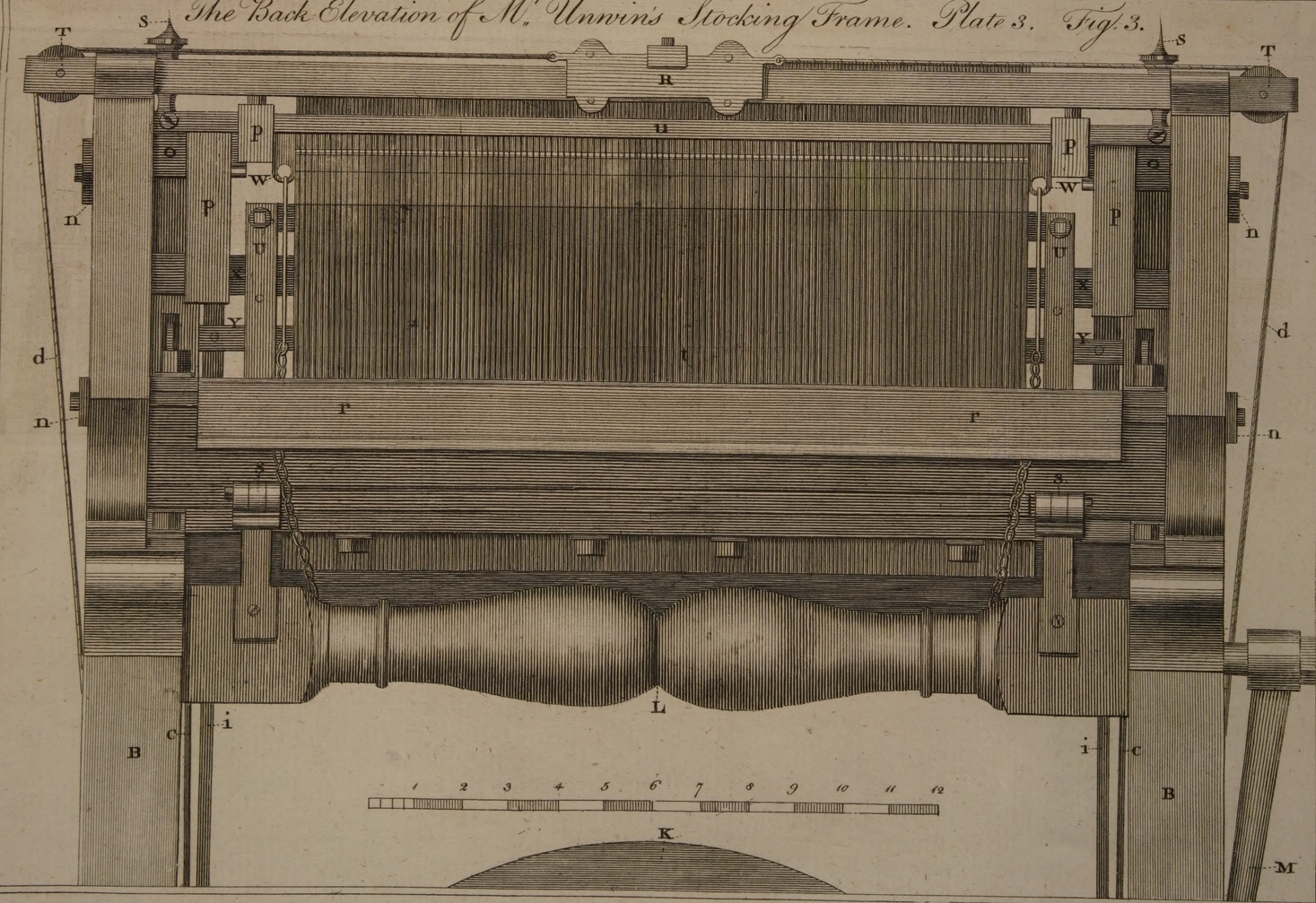
Alex. M. Bailey del.

T. Caldwall sculp.

A Plan of Mr. Unwin's Stocking Frame. Plate 3. Fig. 4.



The Back Elevation of Mr. Unwin's Stocking Frame. Plate 3. Fig. 3.

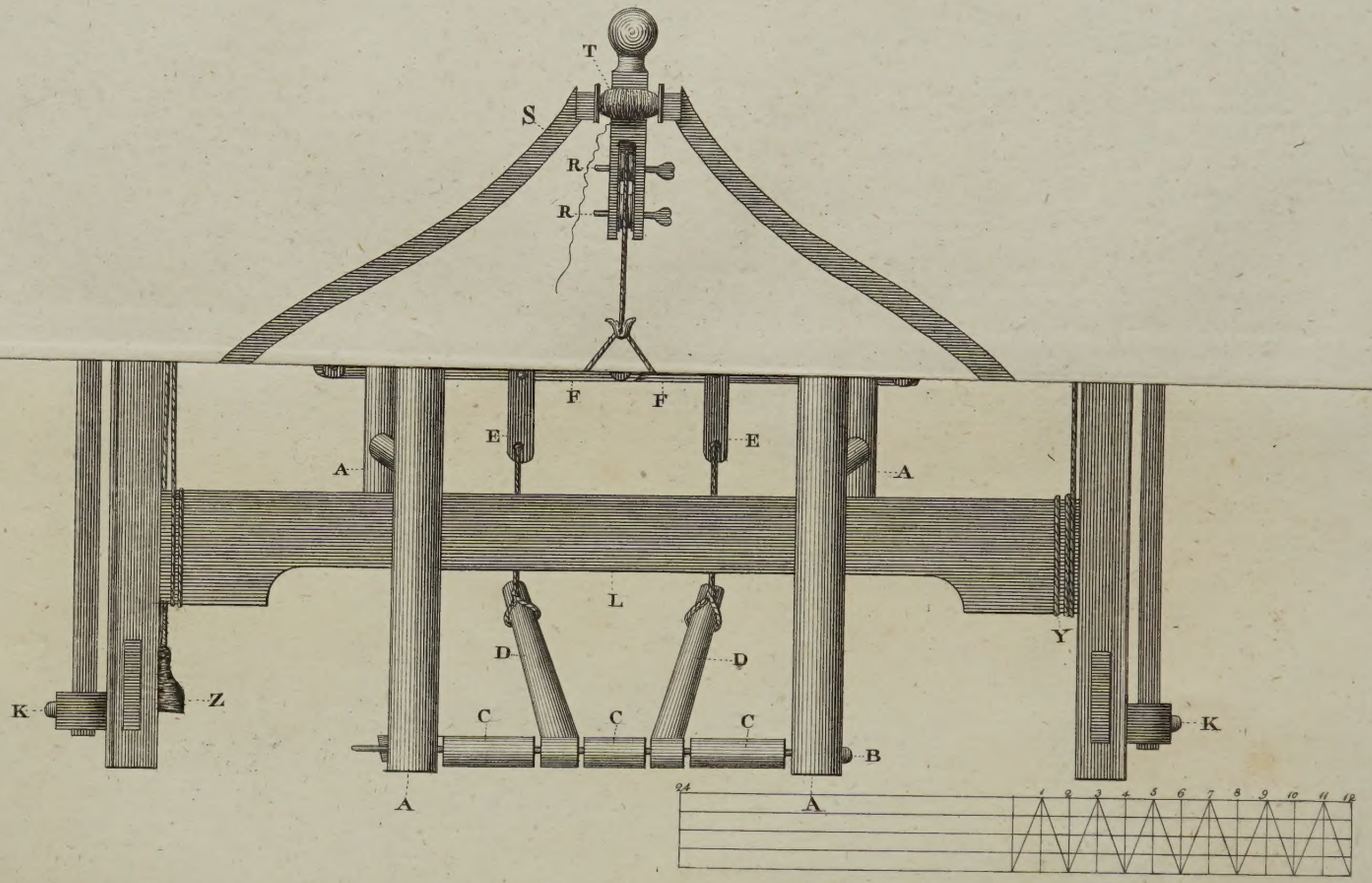


Alex. M. Bailey del.t

J. Caldwall sculp.t

Front View of Mr. Almond's Loom.

Plate 1. Fig 1.

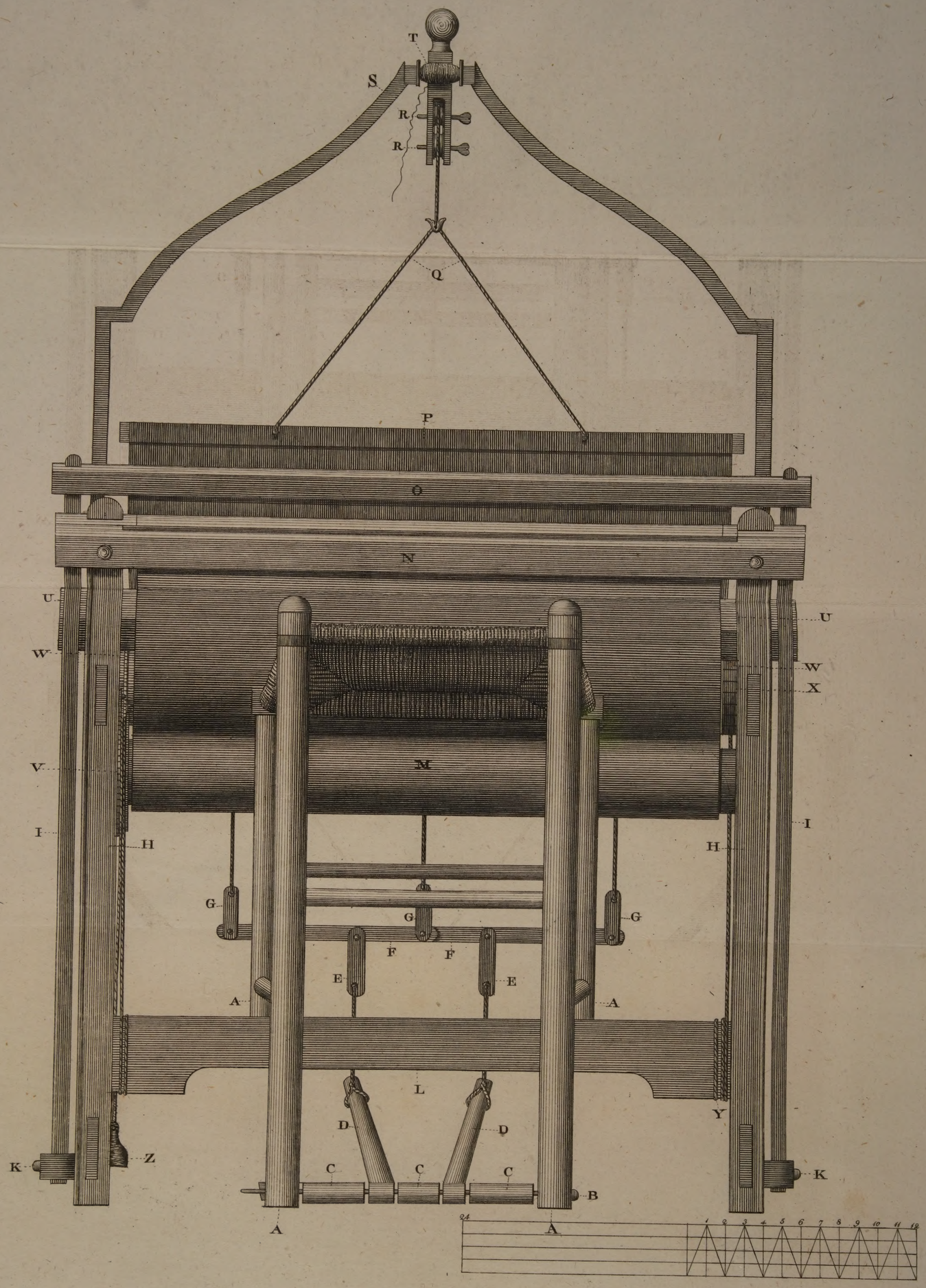


Alex.r Mabyn Bailey del.

T. Miller sculp.

Front View of Mr. Almond's Loom.

Plate 1. Fig 1.

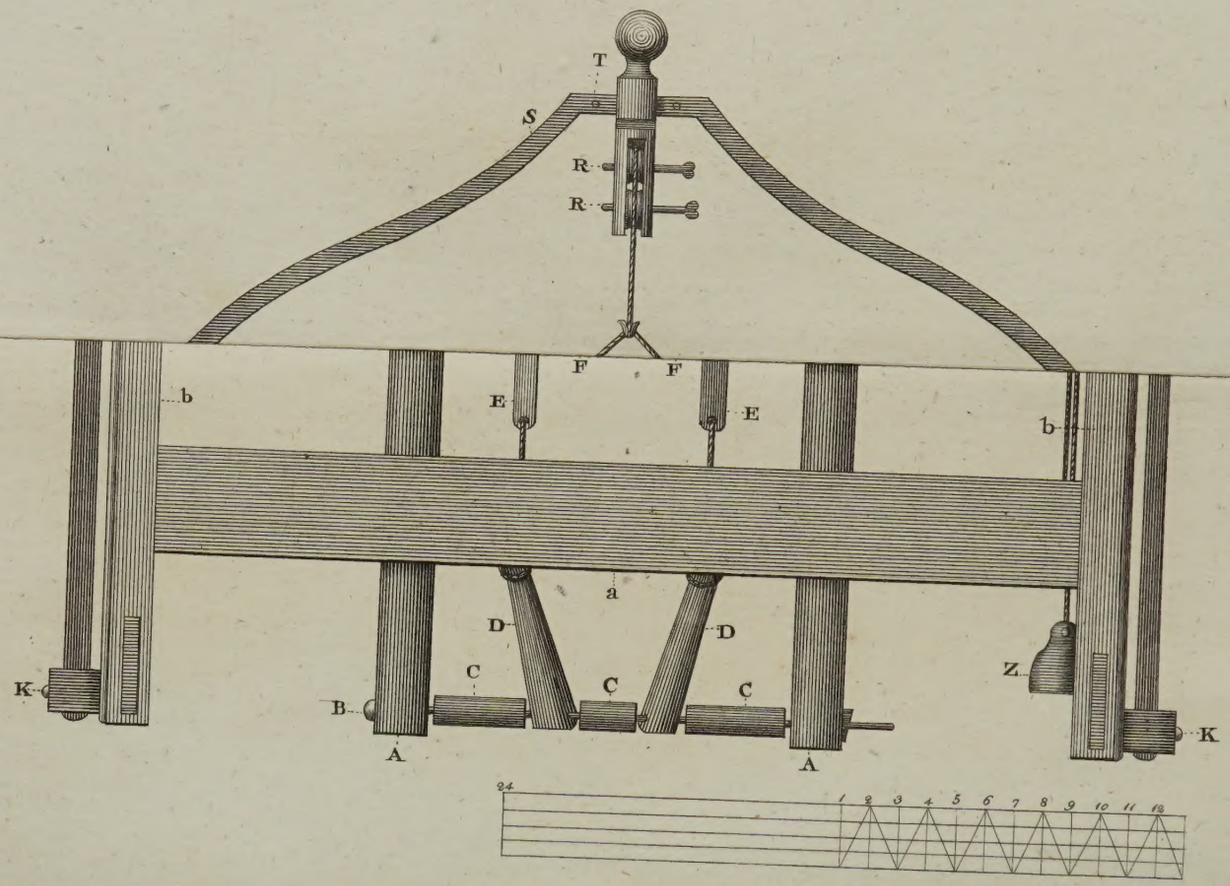


Alex.r Mabyn Bailey del.

T. Miller sculp.

Back View of Mr. Almond's Loom.

Plate 2. Fig 2.

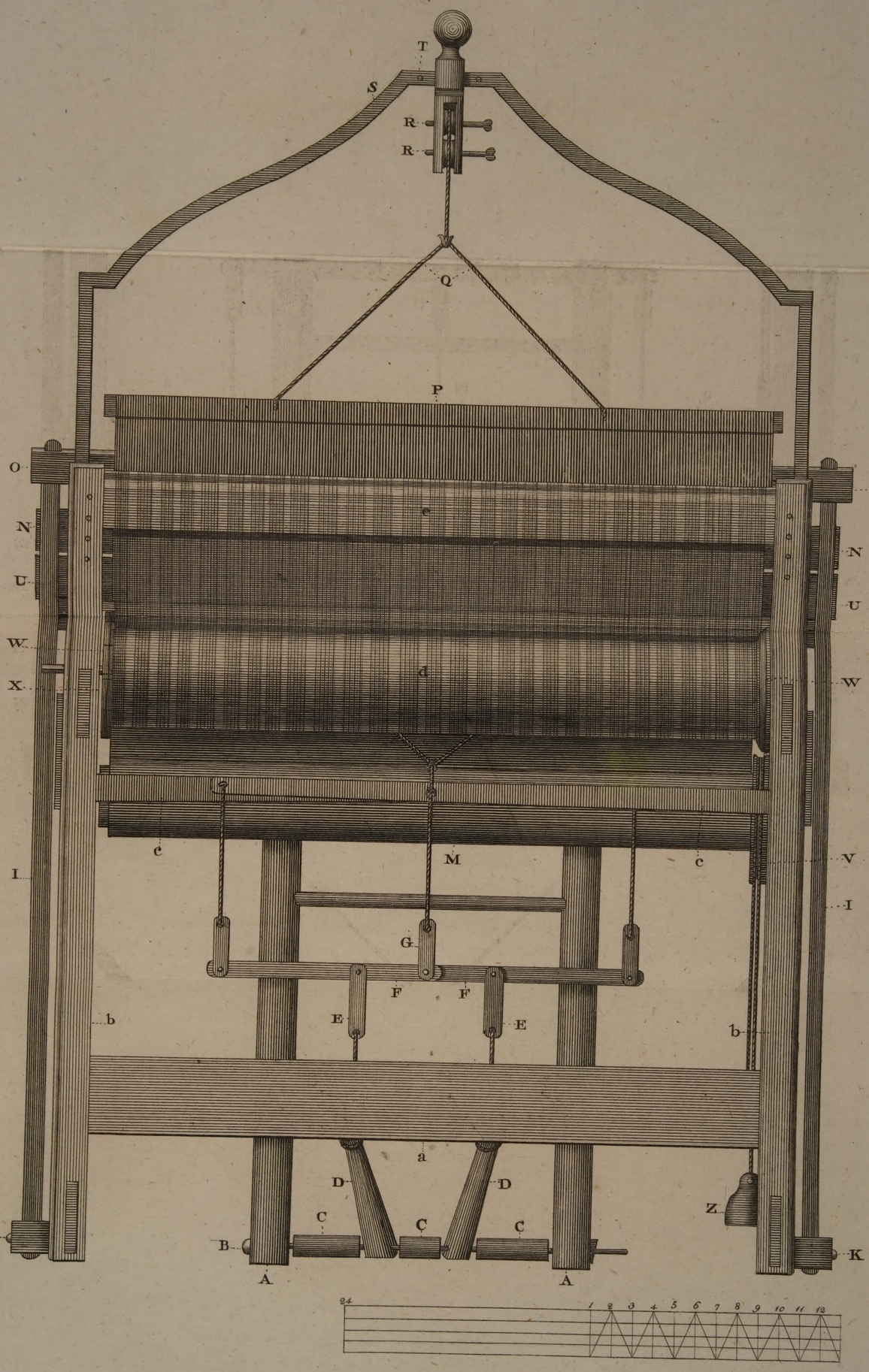


Alex^r Mabyn Bailey del.

T. Miller sculp.

Back View of Mr. Almond's Loom.

Plate 2. Fig 2.



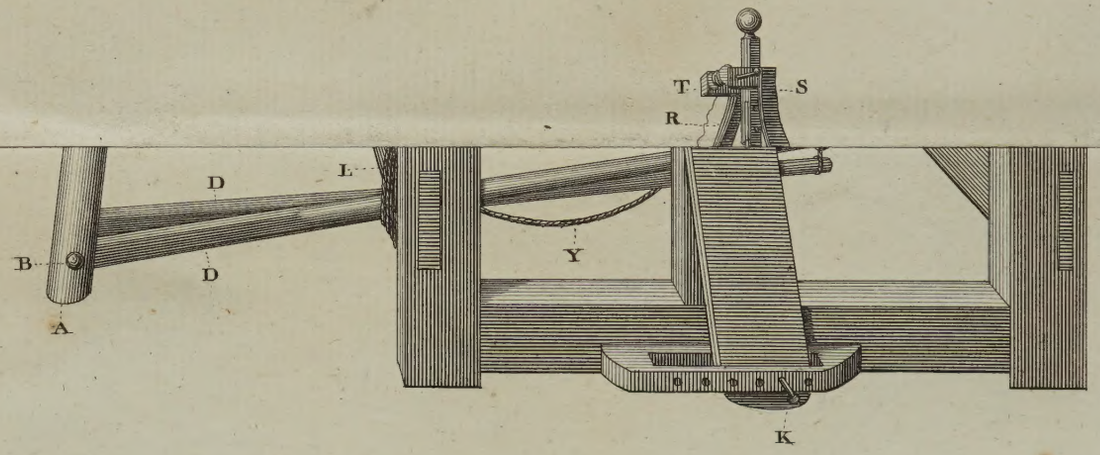
Alex^r Mabyn Bailey del.

T. Miller sculp.

N°. XXXIII p 173.

Perspective View of M.r Almond's Loom.

Plate 3. Fig 3.



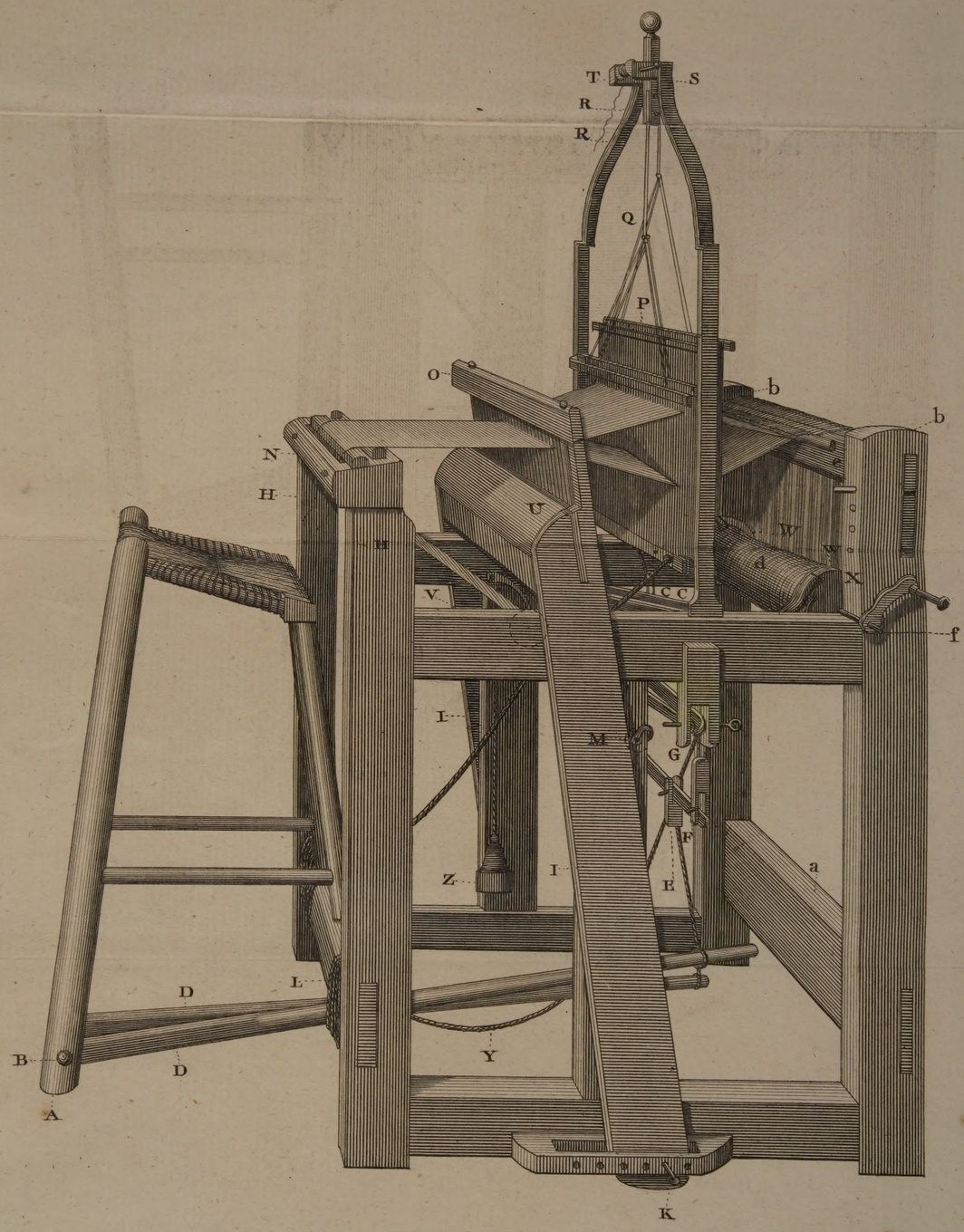
Alex.r Mabyn Bailey del.

T. Miller sculp.

N°. XXXIII p 173.

Perspective View of M.r Almond's Loom.

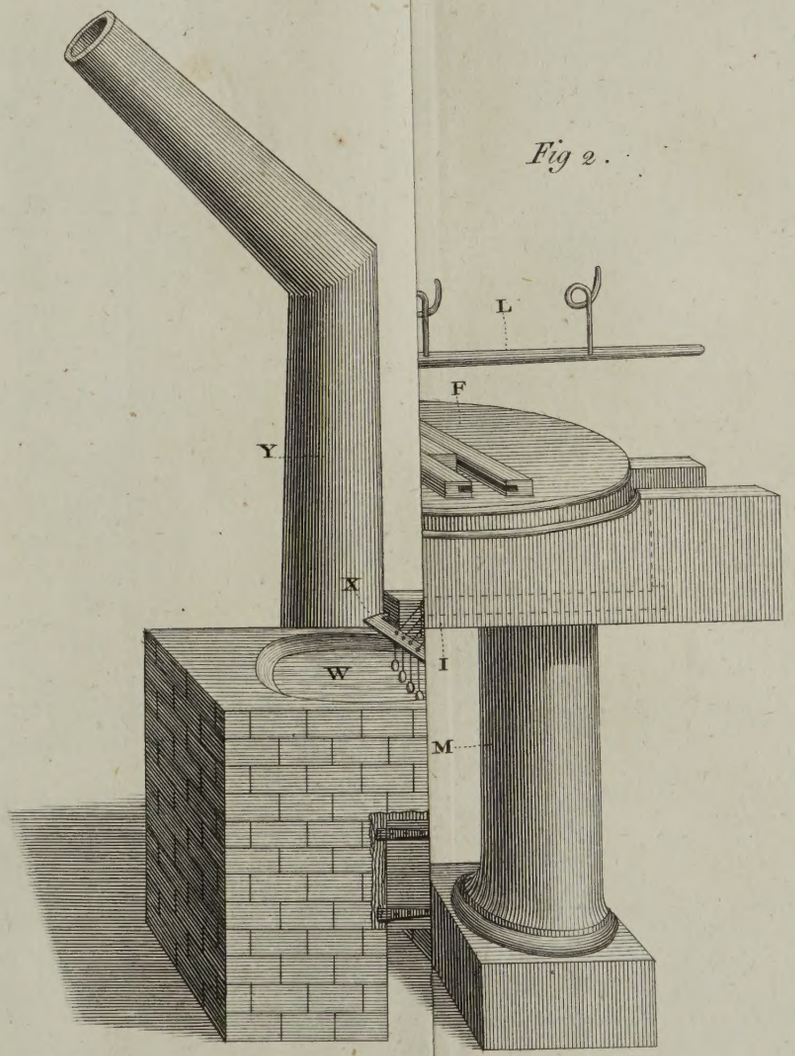
Plate 3. Fig 3.



Alex.r Malyn Bailey, del.

T. Miller, sculp.

Fig 2.



Scale 3 Inches to a Foot

W. Bailey Junr. del.

T. Miller sculp.

A Perspective View of an Italian Silk Reel.

Fig 1.

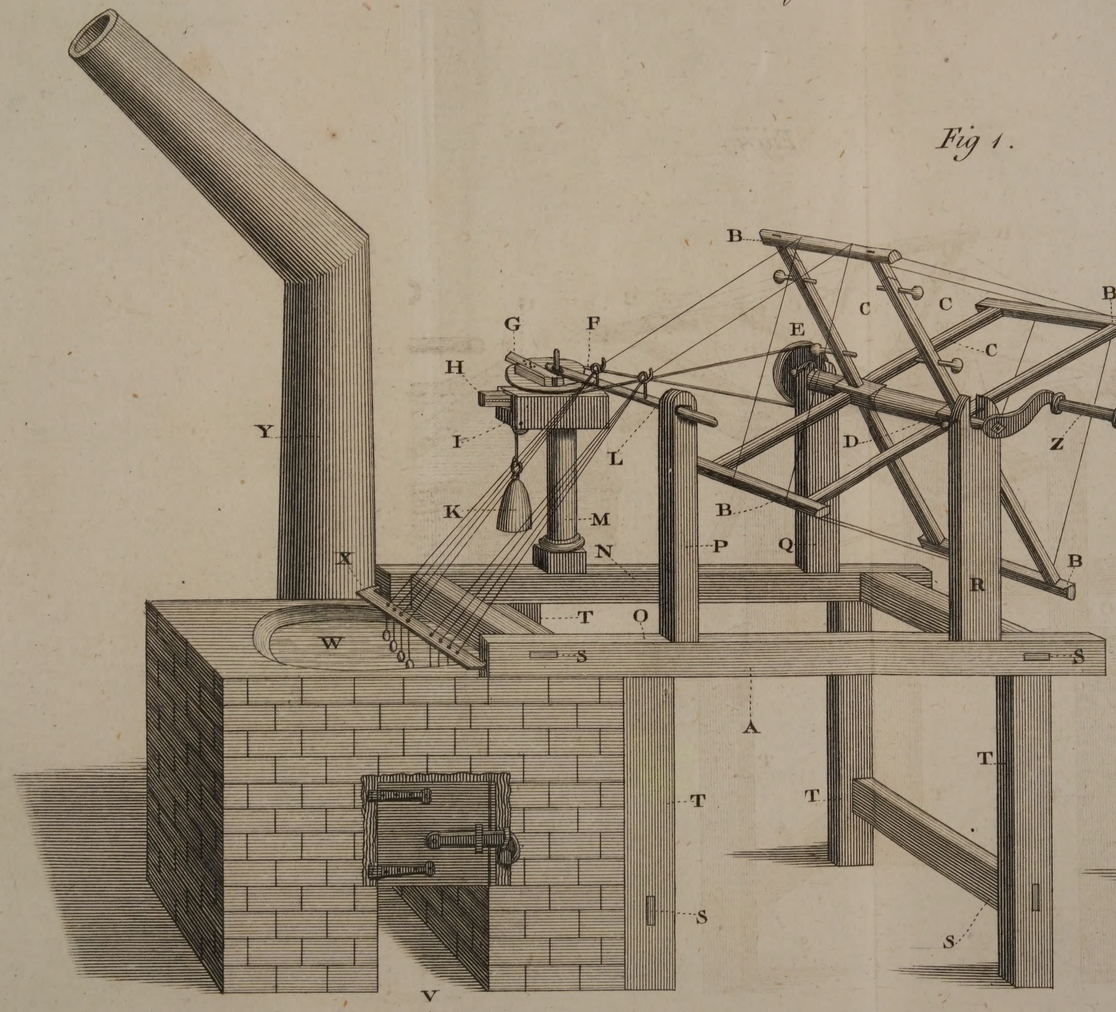
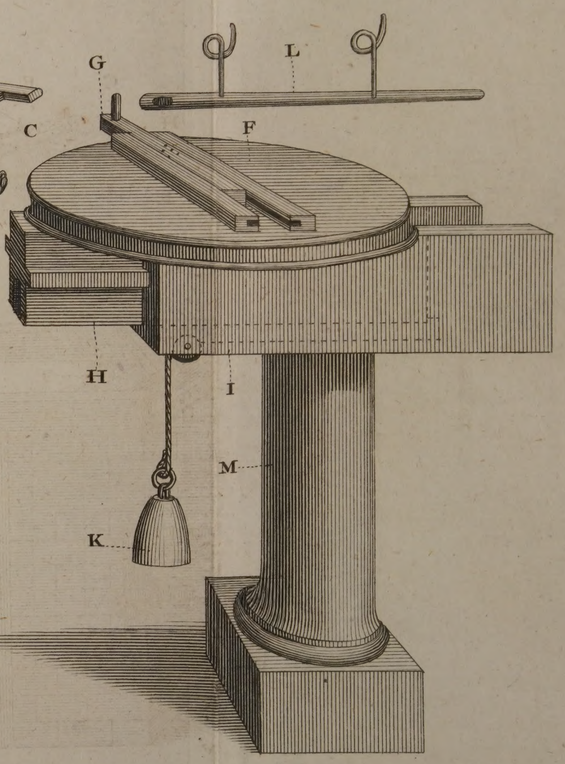


Fig 2.



Scale 3 Inches to a Foot

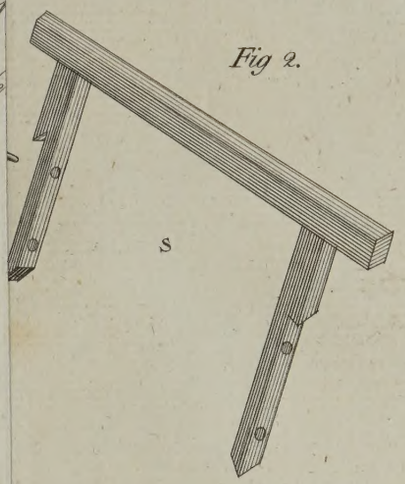
W. Bailey Junr. del.

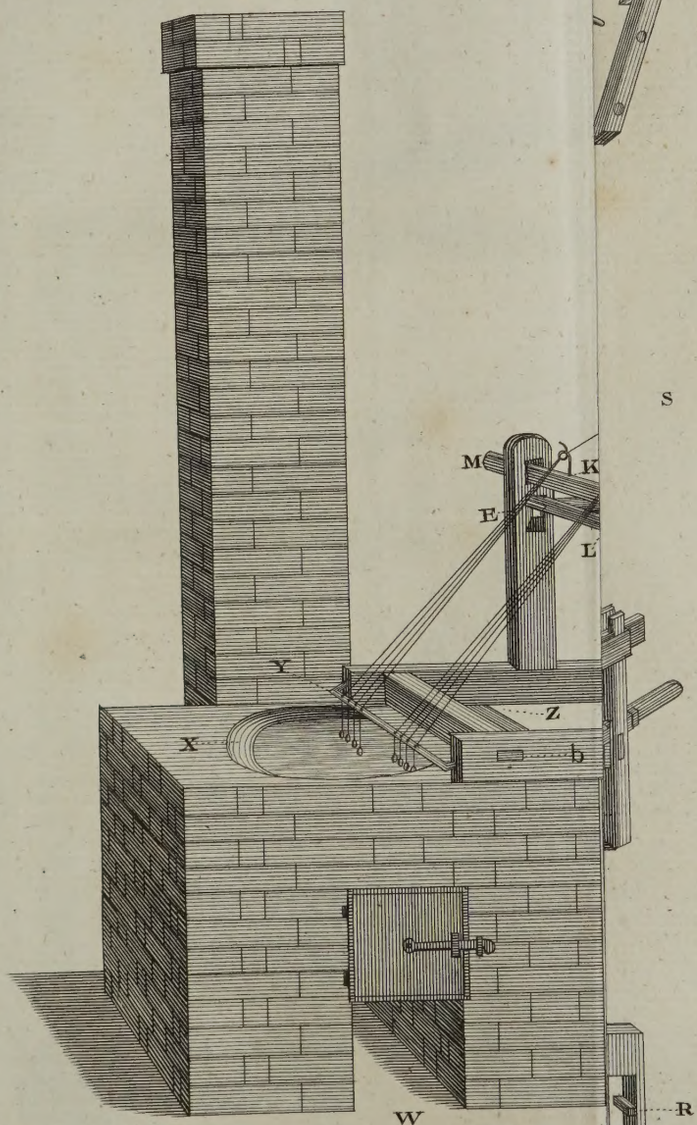
T. Muller sculp.

A Persp

M.r Ve

Fig 2.





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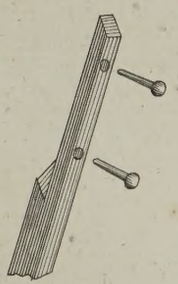
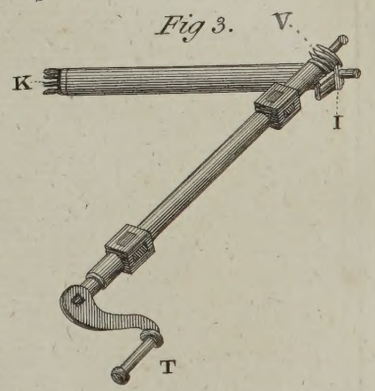


Fig 3.



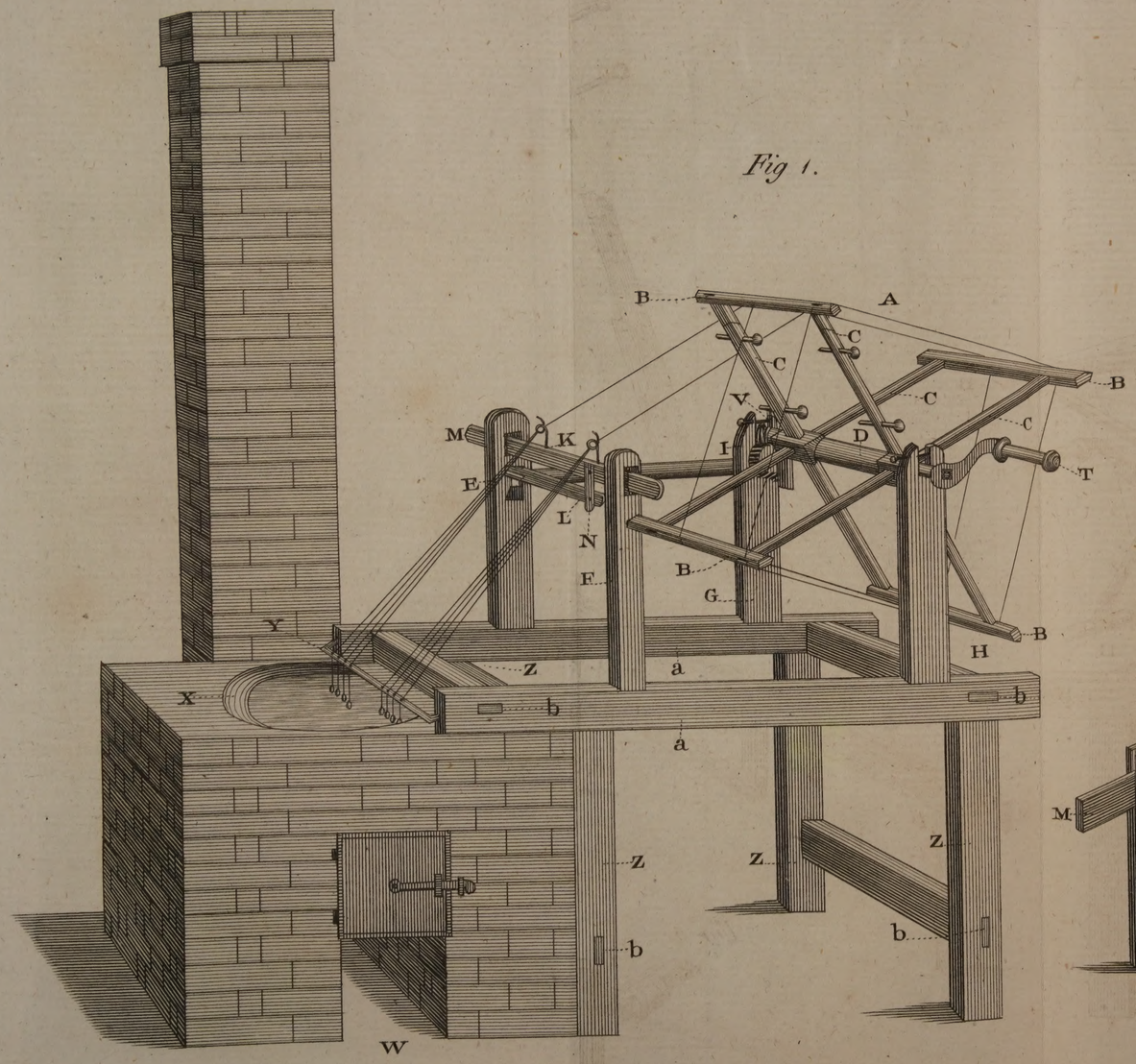
Scale one Inch to a Foot.

W.m Bailey Junr. dol

J. Miller sc.

A Perspective View of the Italian Silk Reel, to which is added
M.r Verrier's method of laying the Silk obliquely thereon.

Fig 1.



Scale one Inch to a Foot.

Fig 2.

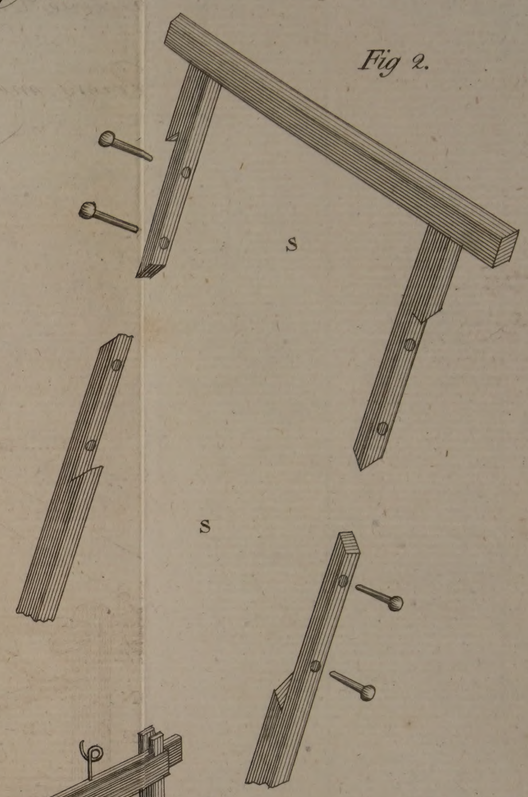


Fig 6.

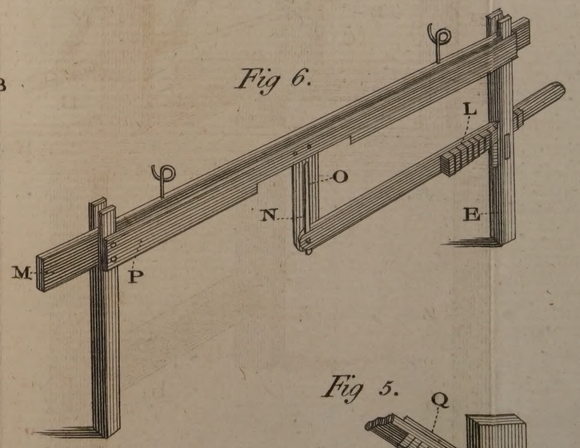


Fig 3.

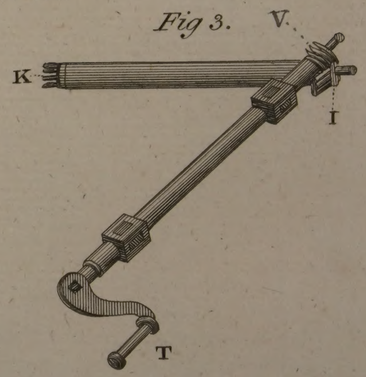


Fig 5.

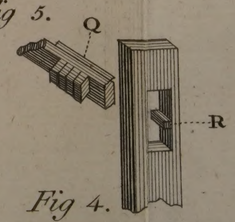
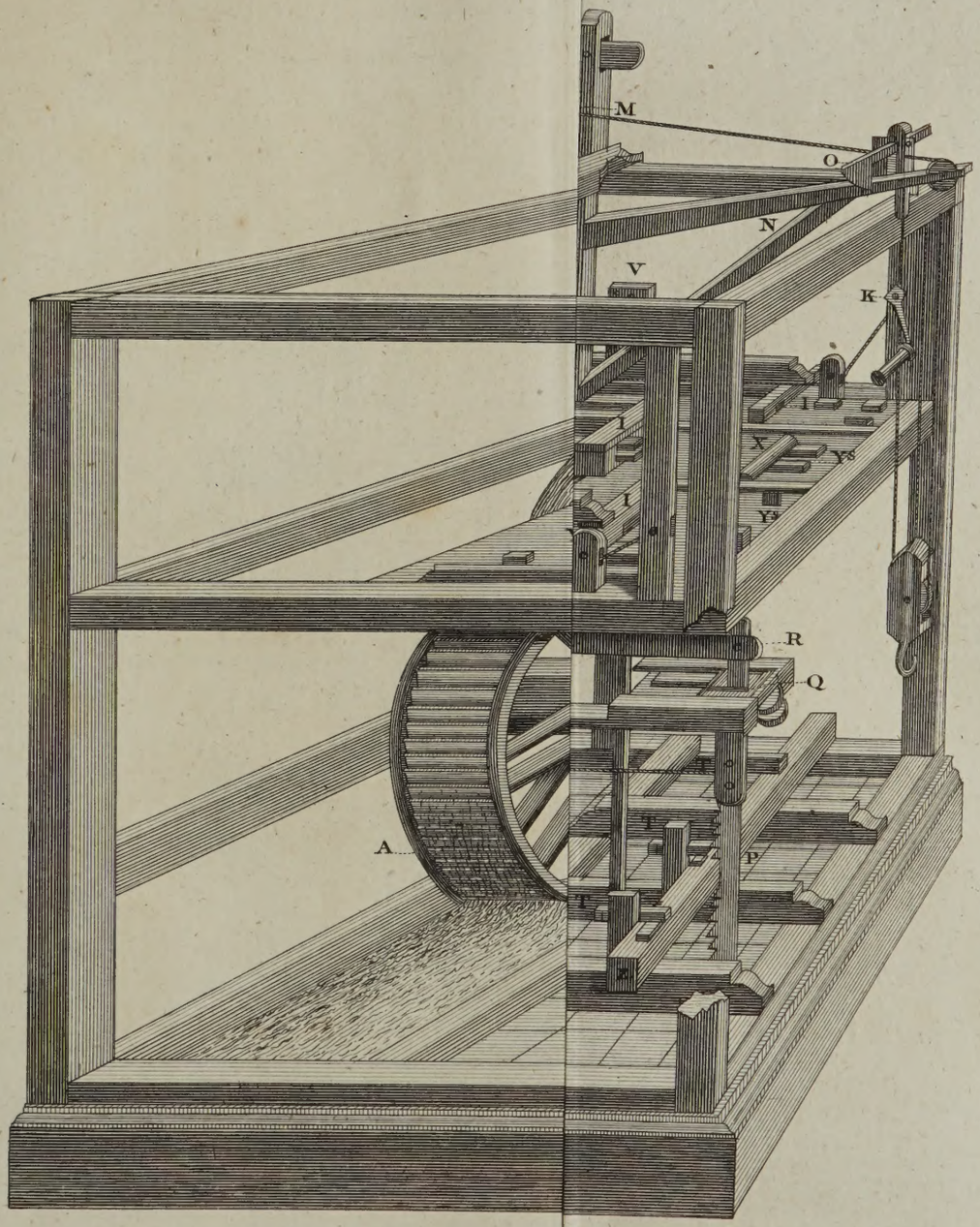


Fig 4.

W.m Bailey Junr. del

J. Miller sc.

A Persp

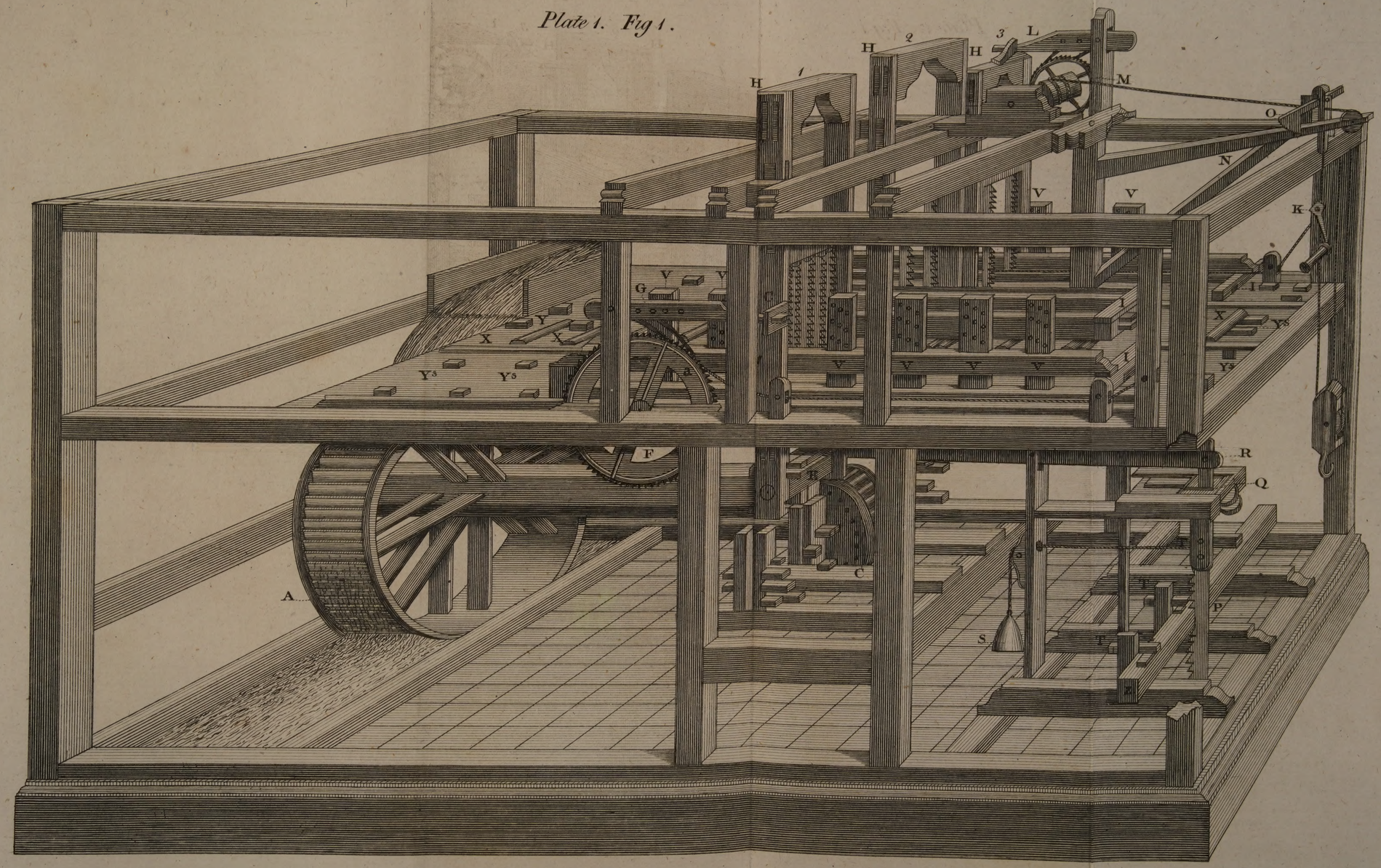


AMBailey del.

TMiller sculp.

A Perspective View of Mr. Standfield's Saw Mill.

Plate 1. Fig 1.

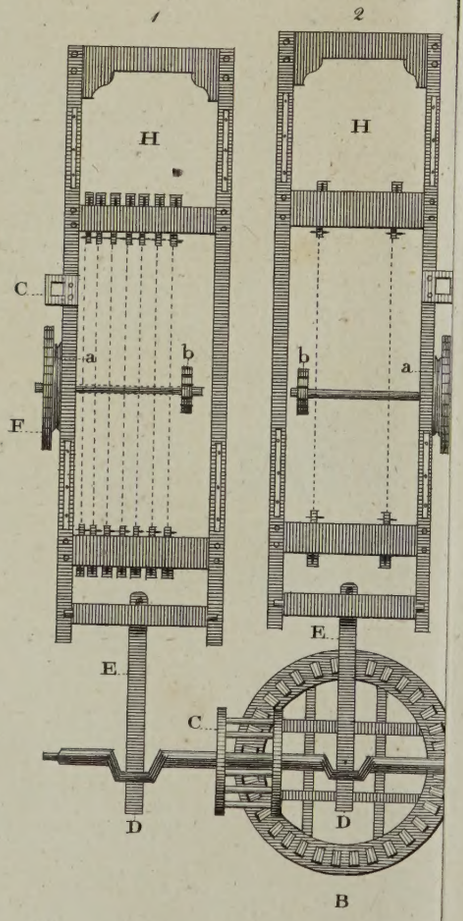


AM Bailey del.

T Miller sculp.

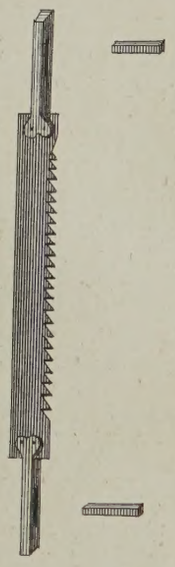
A Geometrical Elevation of the Ratchet Wheel, &c.

Plate 2. Fig 2.



A Perspective View of one of the Jams with its Stretchers & Wedges.

Fig 7.

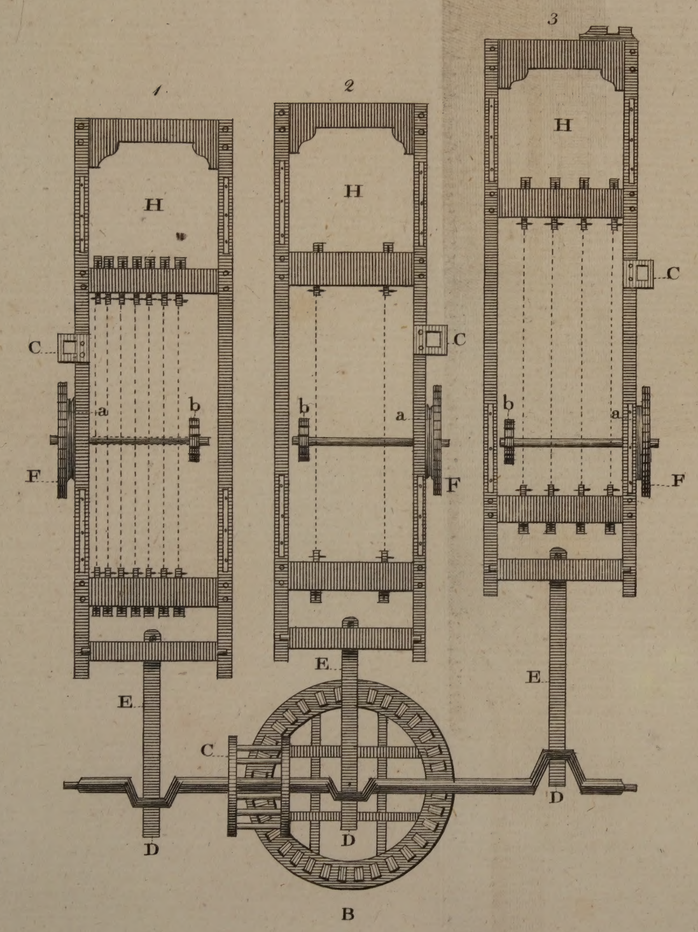


A.M Bailey del.

T. Miller sculp.

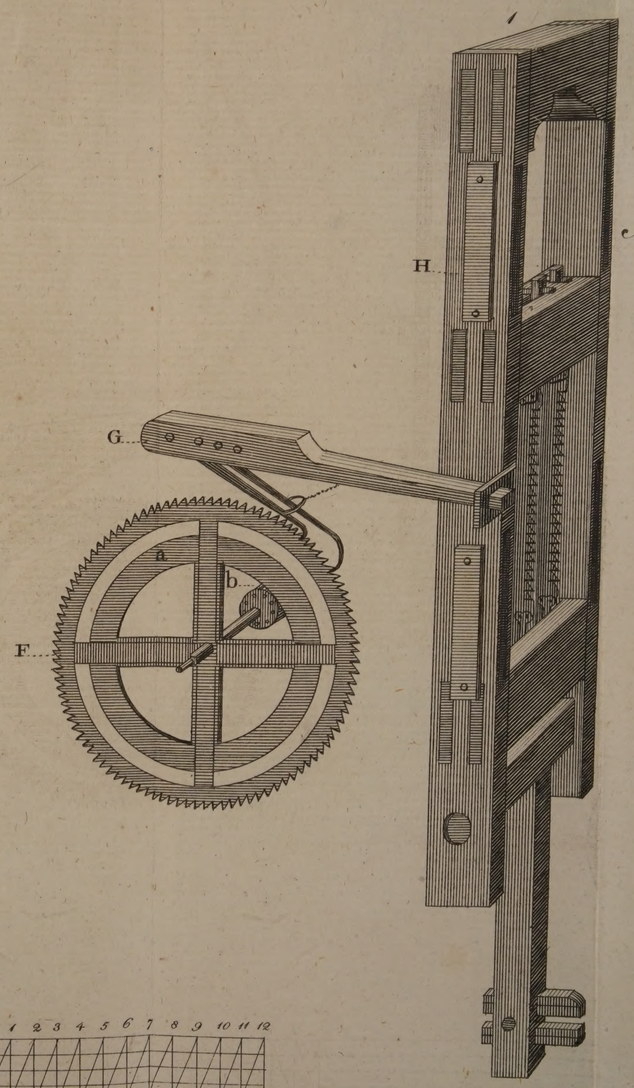
A Geometrical Elevation of the Saw Frames.

Plate 2. Fig 2.



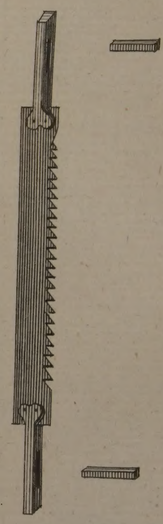
A Perspective View of one of the Saw Frames, Ratchet Wheel, &c.

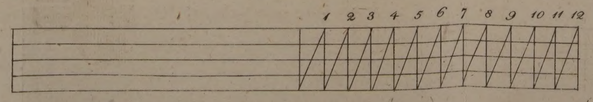
Fig 6



A Perspective View of one of the Saws with it's Stretchers & Wedges.

Fig 7.

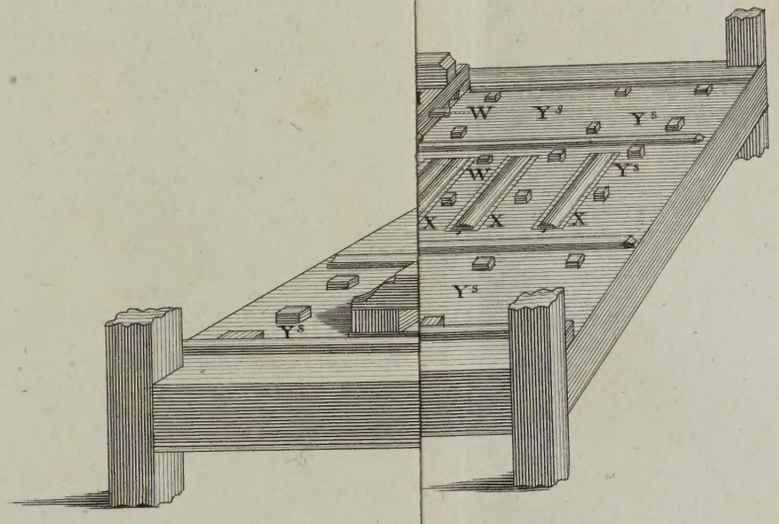




AMBailey del.

T.Miller sculp.

Perspectives &c.

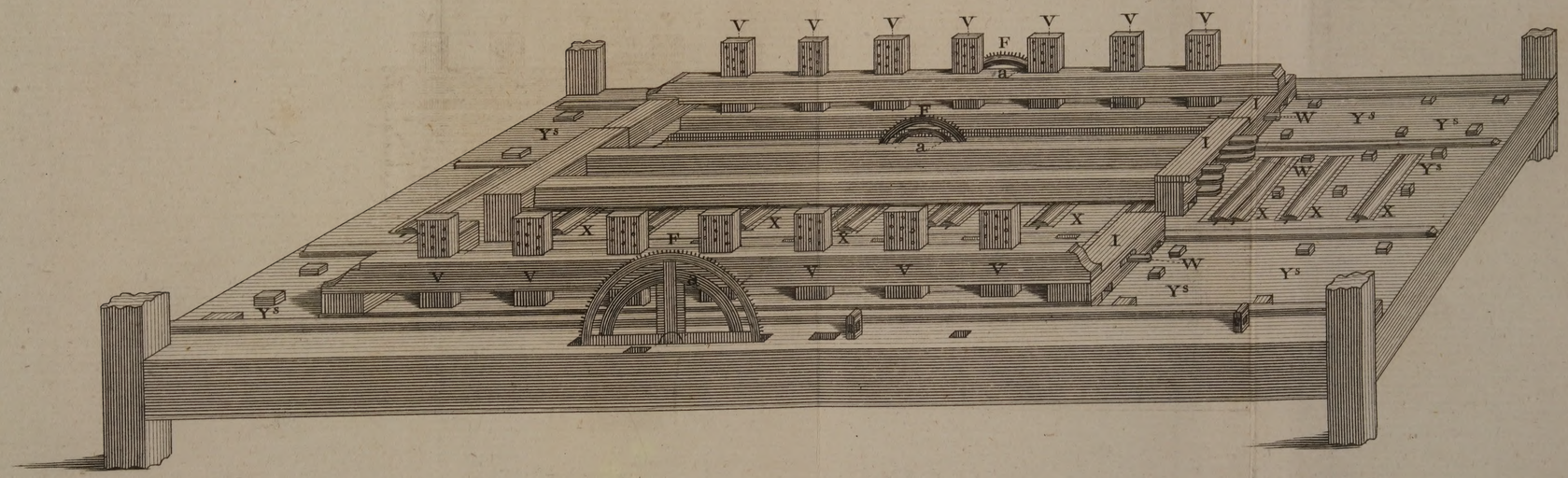


A. M. Bailey del.

T. Miller sc.

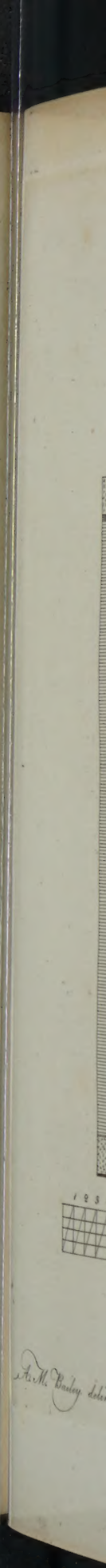
Perspective View of the Floor, Carriages, Rollers, Ratchet-Wheels &c.

Plate 3. *Fig. 3.*

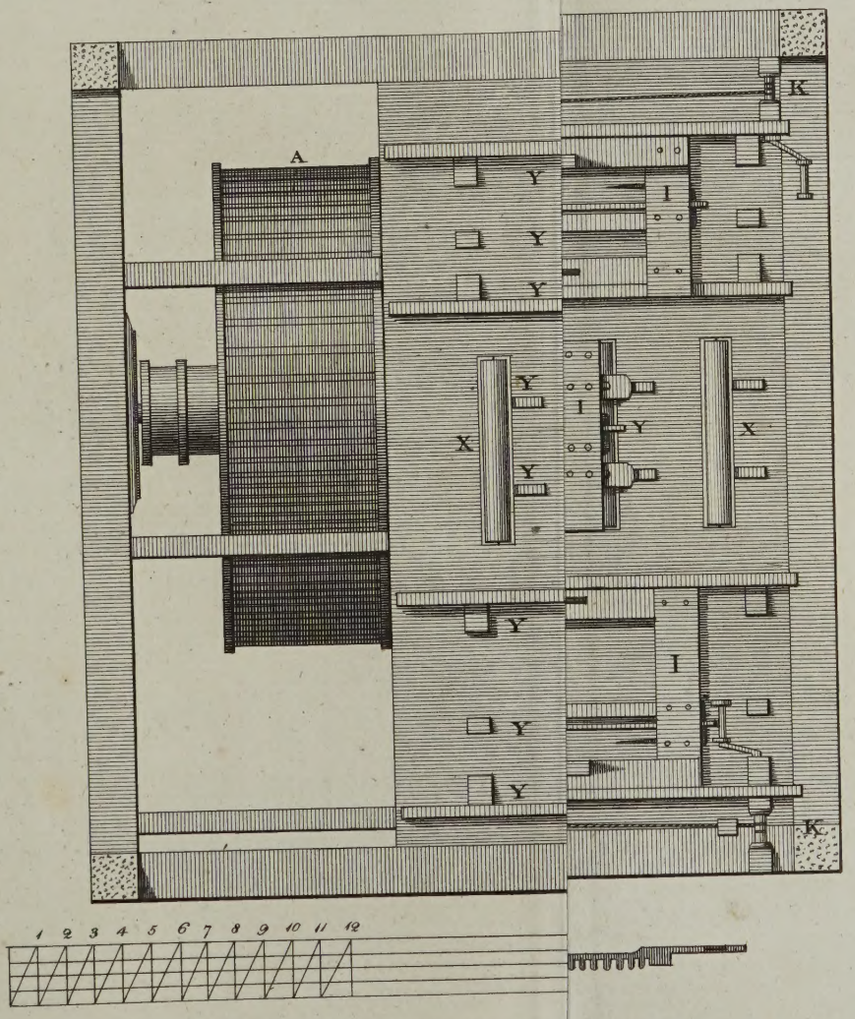


A. M. Bailey del.

T. Miller sc.



Geometrical Pl.&c.

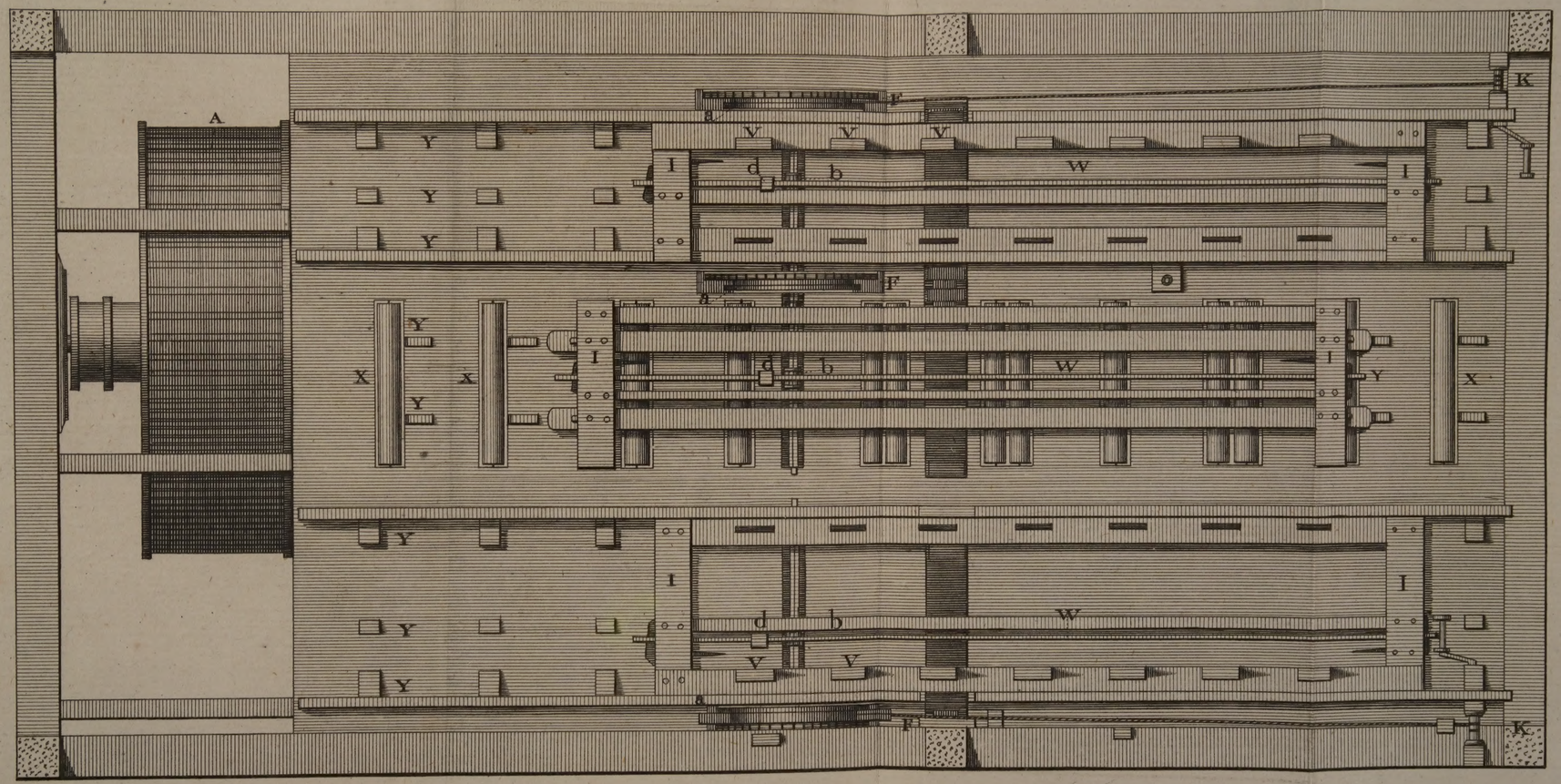


A. M. Bailey. delin.

T. Miller sc.

Geometrical Plan of the Water Wheel, Carriage, Frames, Ratchet Wheels, &c.

Plate 4 Fig 5.



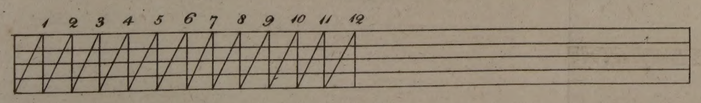
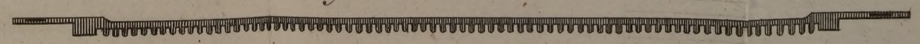


Plate. 4. Fig. 4.



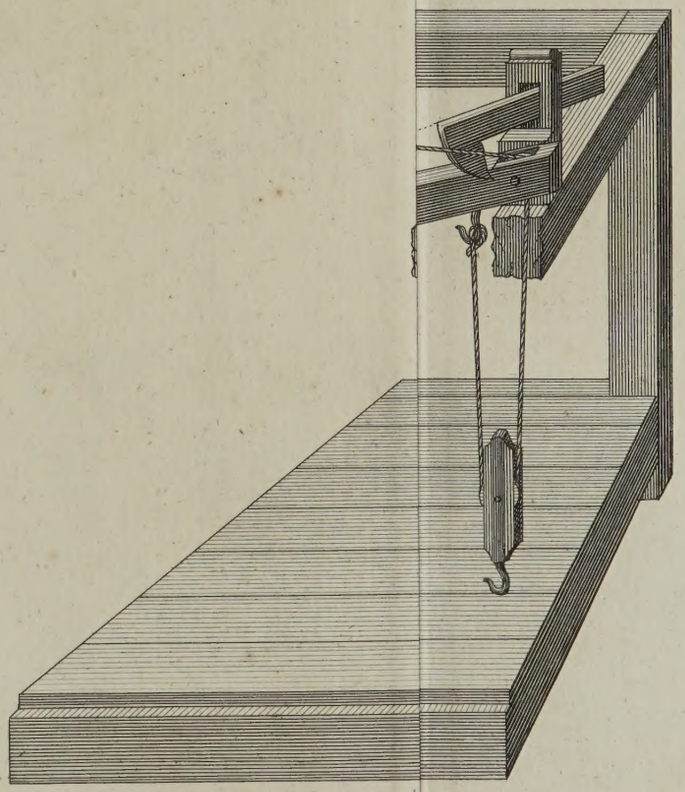
A. M. Bailey. delin.

T. Miller sc.

NoXL. p 231.

A Pers

Plate 5. Fig. 8.

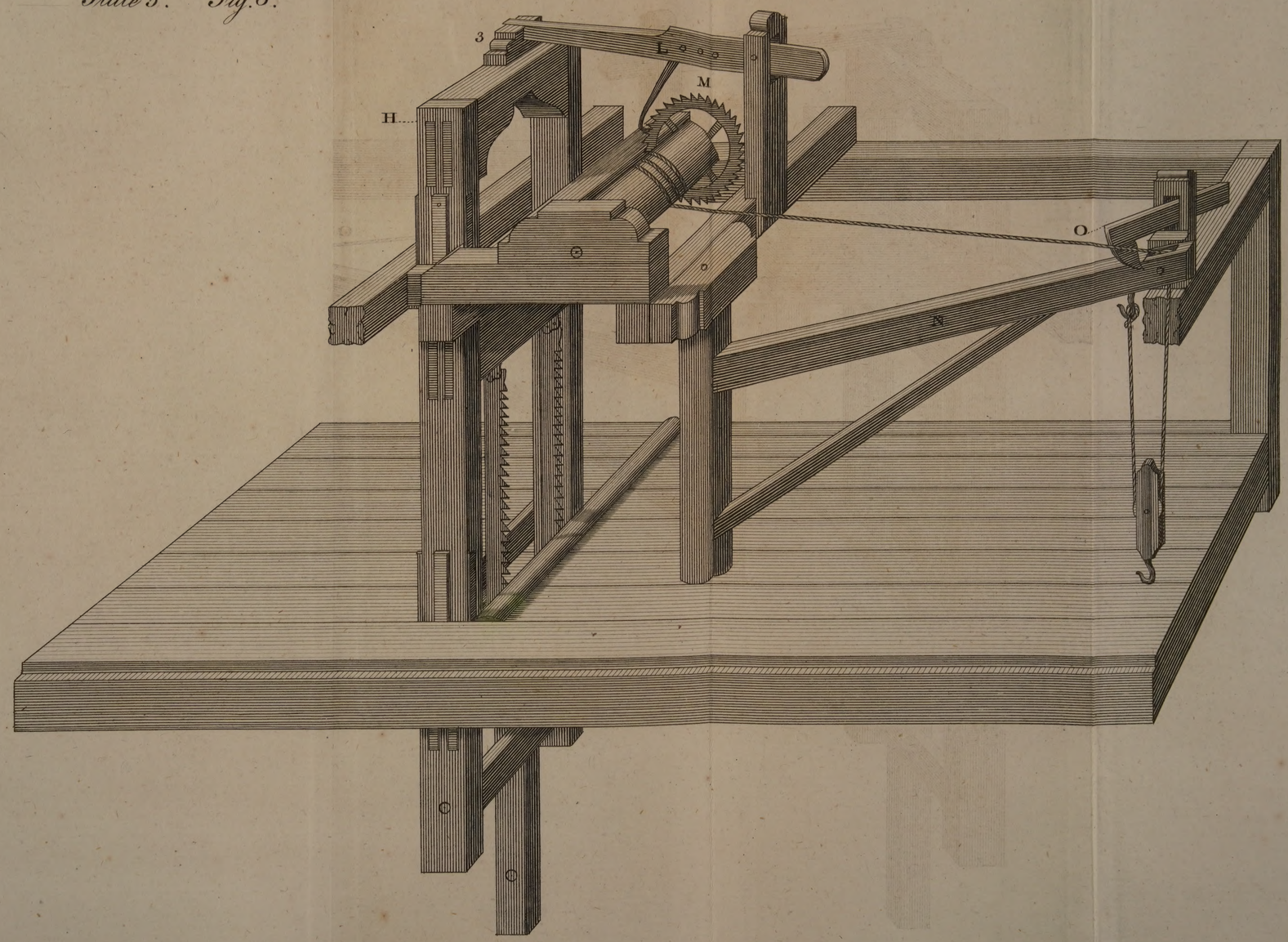


A. M. Bailey delin.

T. Miller sculp

A Perspective View of one of the Saw Frames, Ratchet Wheel, Crane, &c.

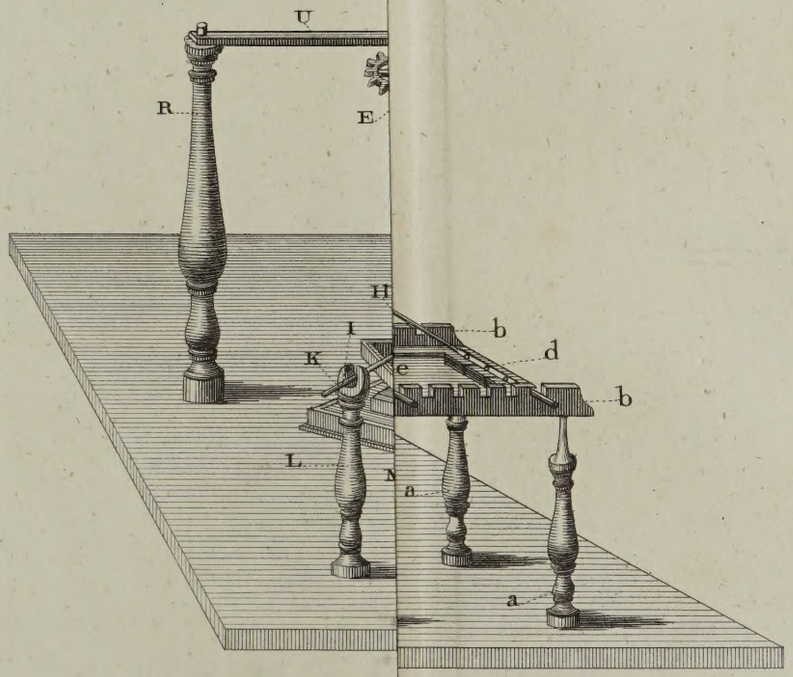
Plate 5. Fig. 8.



A M Bailey delin.

T. Miller sculp

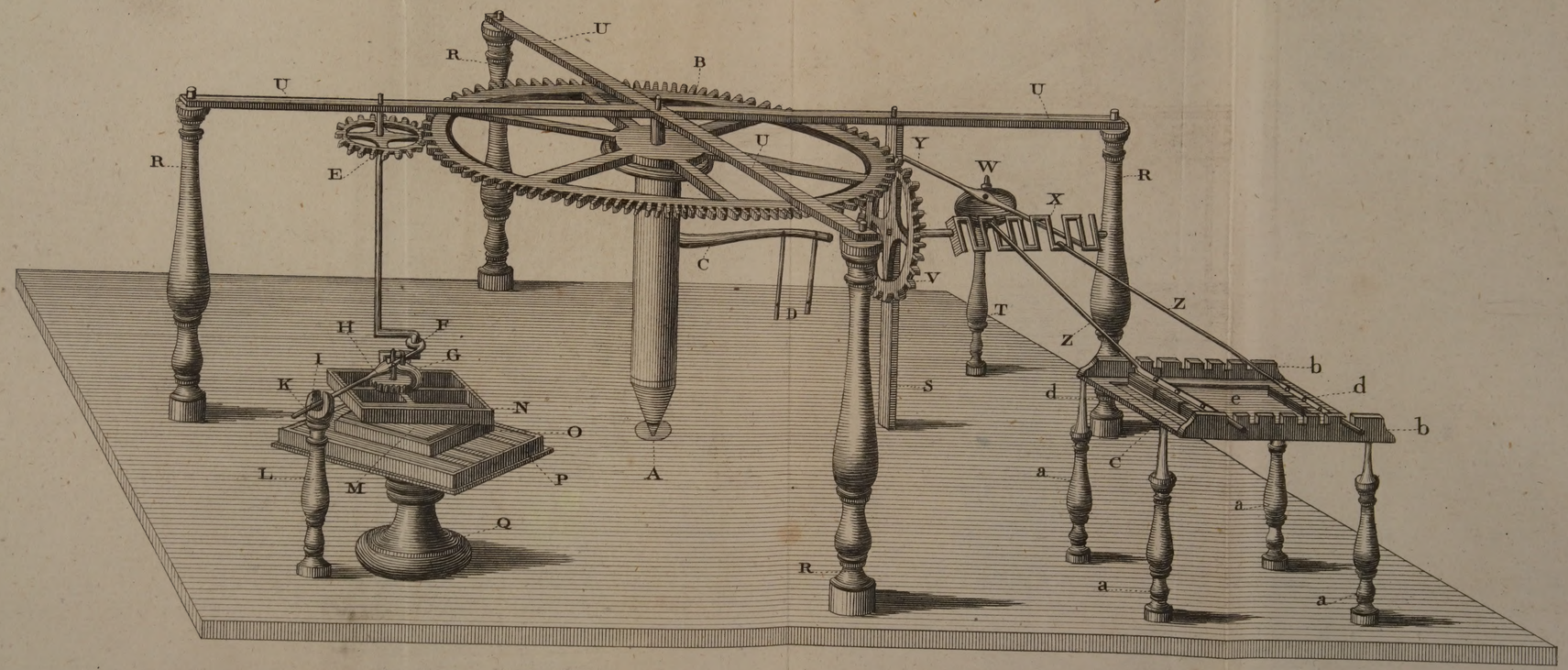
&c.



T. Miller sculp

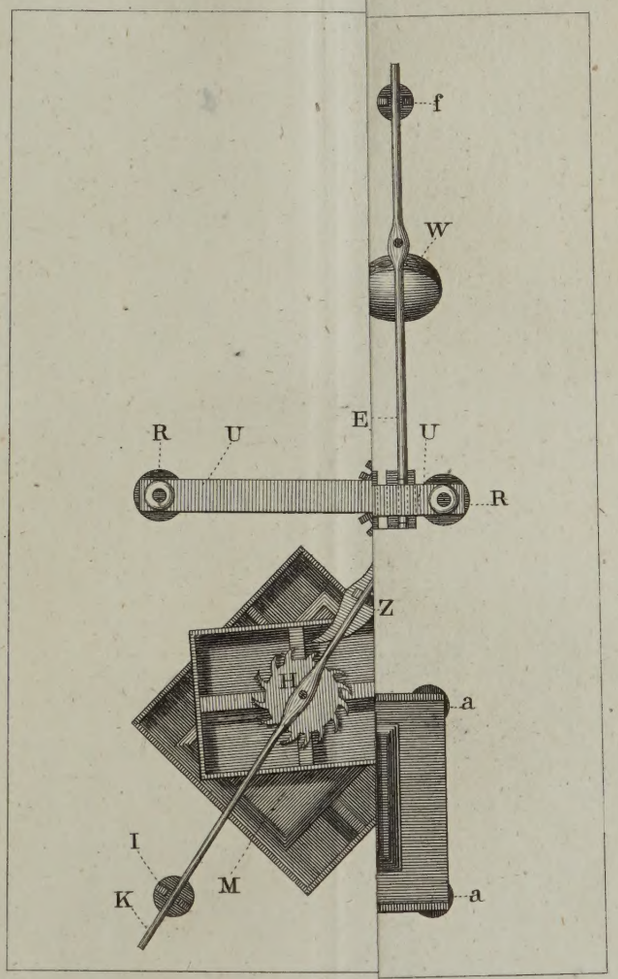
A Perspective View of Mr. Burrows Machine for grinding Glass &c.

Plate 1. Fig 1.



T. Miller sculp

A Geometrical &c.

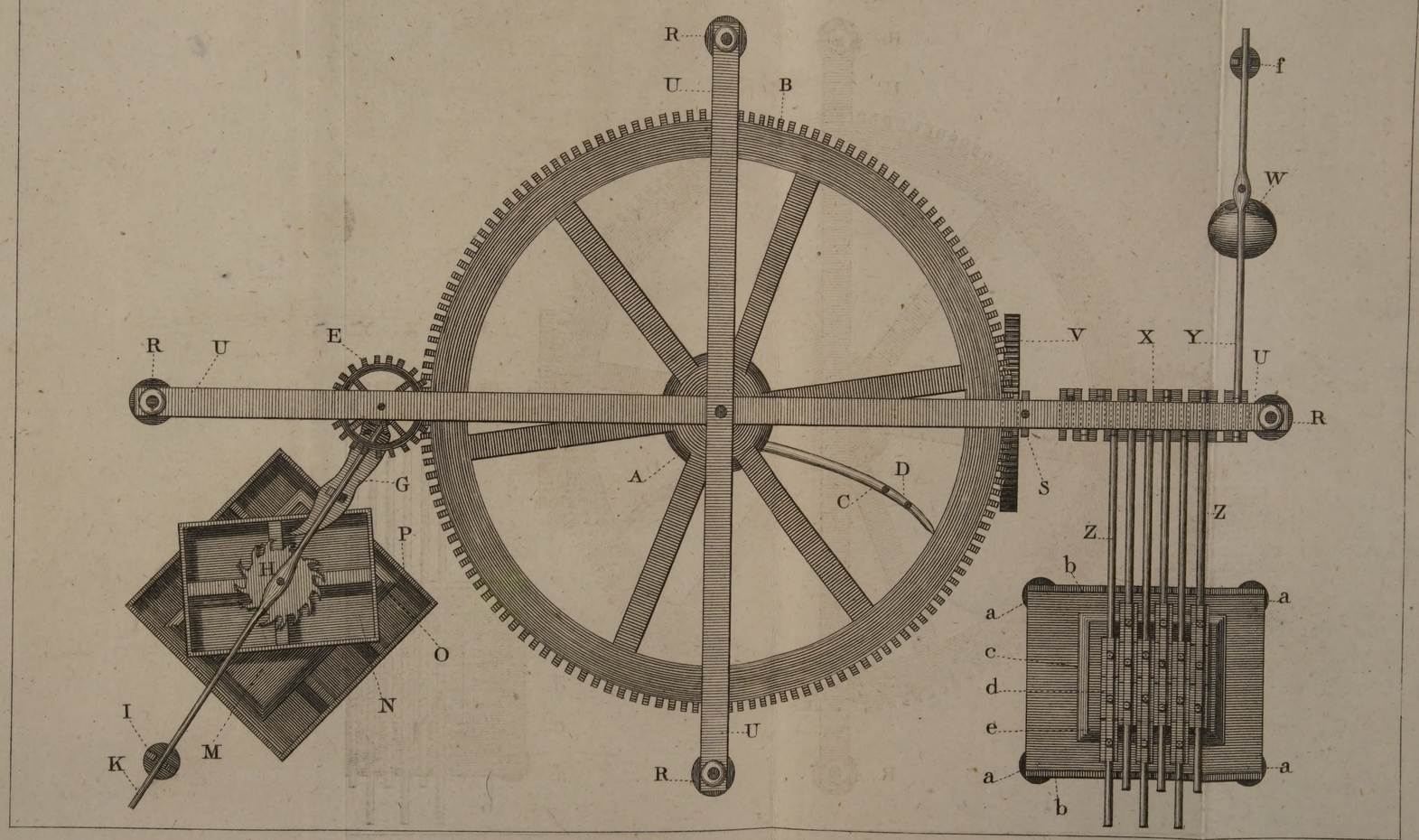


A. M. Baily del.

T. Miller sculp.

A Geometrical Plan of Mr. Burrow's Machine for grinding Glaſs, &c.

Plate 2 Fig 2



A. M. Baily del.

T. Miller sculp.

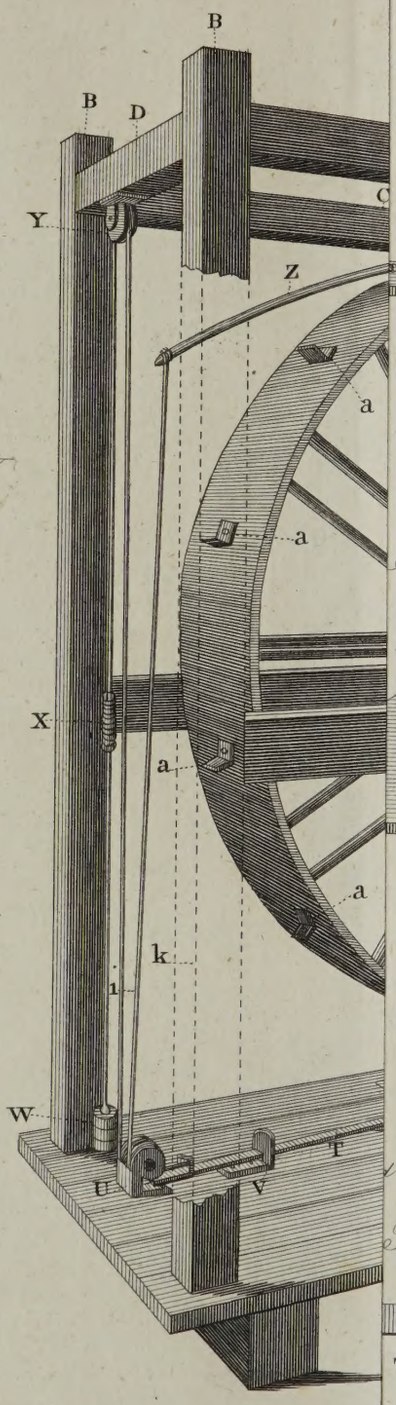


Fig. 1st.

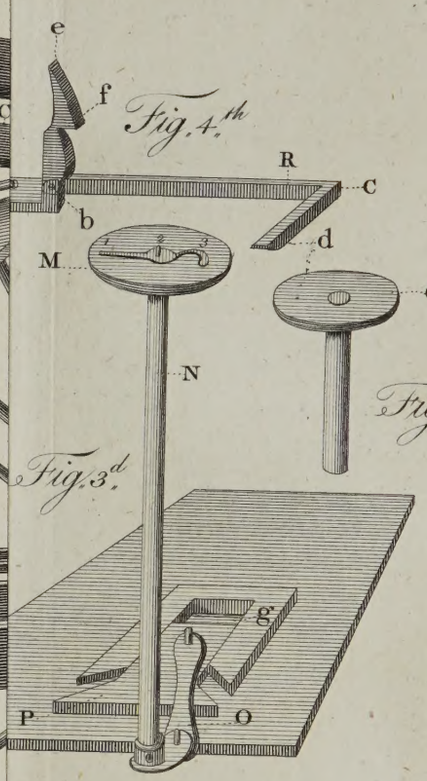
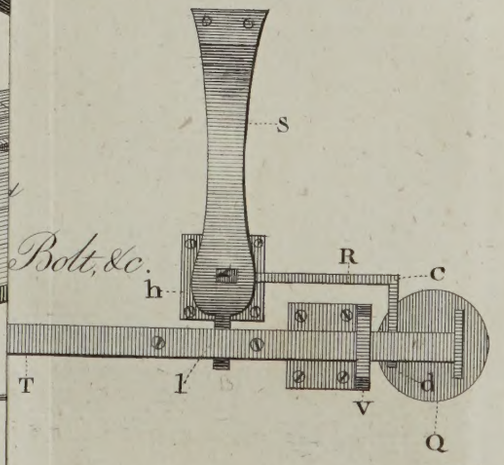


Fig. 4th.

Fig. 5th.

Fig. 3d.



Bolt, &c.

T. Miller sculp.

A Perspective View of Mr. Pinchbeck's Crane.

Fig. 1st

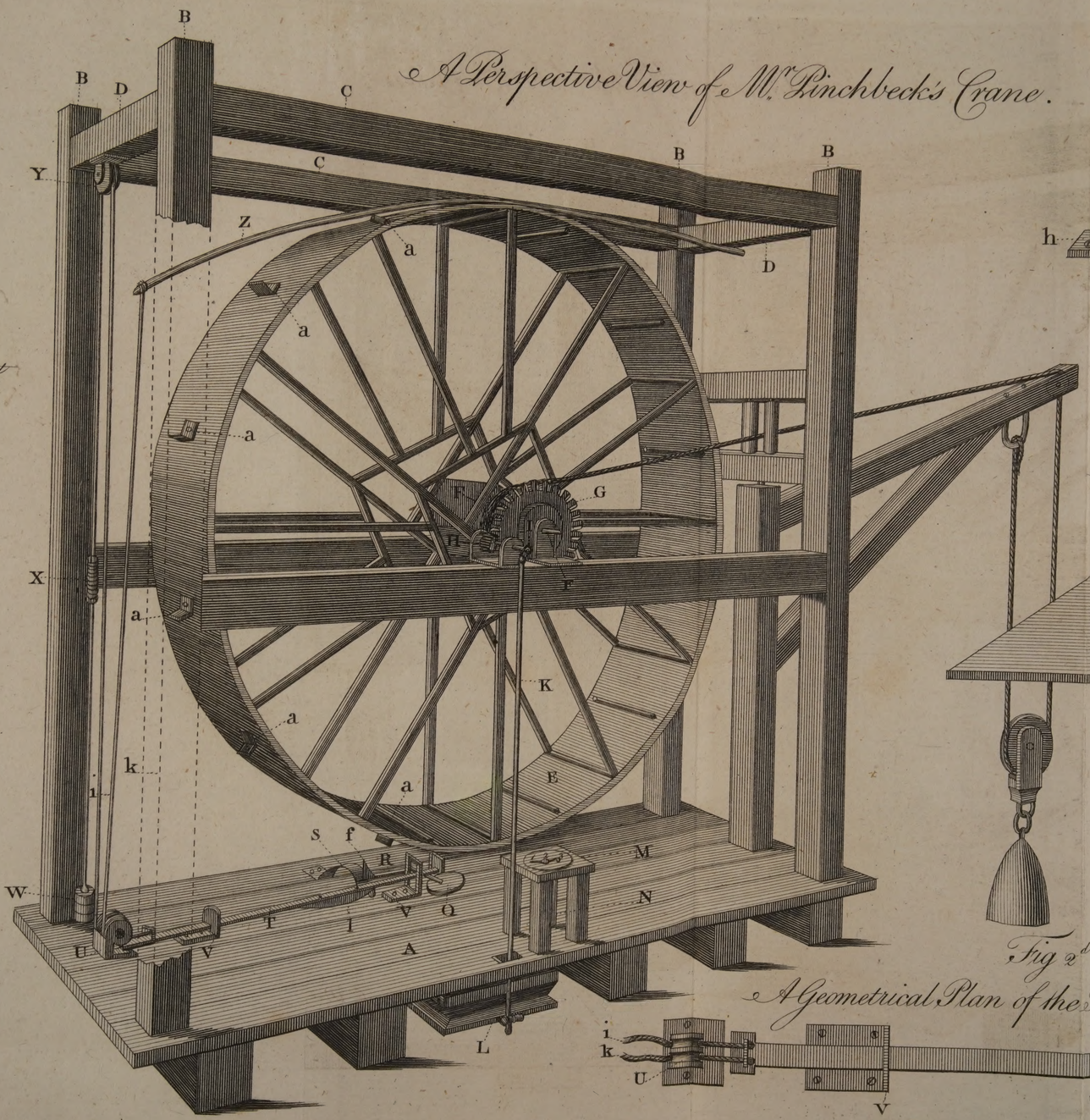


Fig. 4th

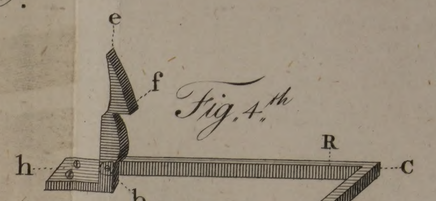


Fig. 5th

Fig. 3d

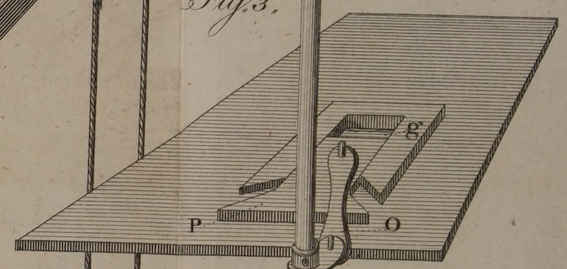
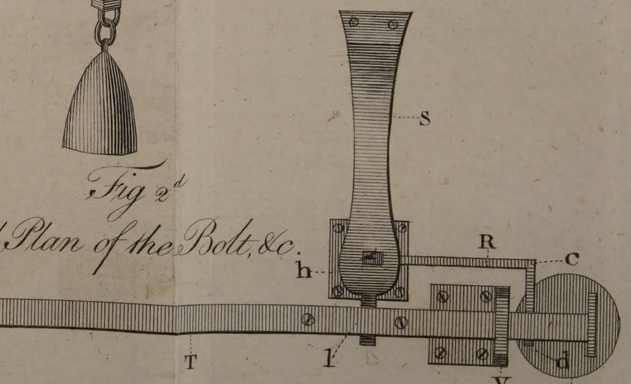


Fig 2d



A Geometrical Plan of the Bolt, &c.

T. Miller sculp.

A View of the Machine lau[illegible] M.r Wirtz Hydraulic Machine.

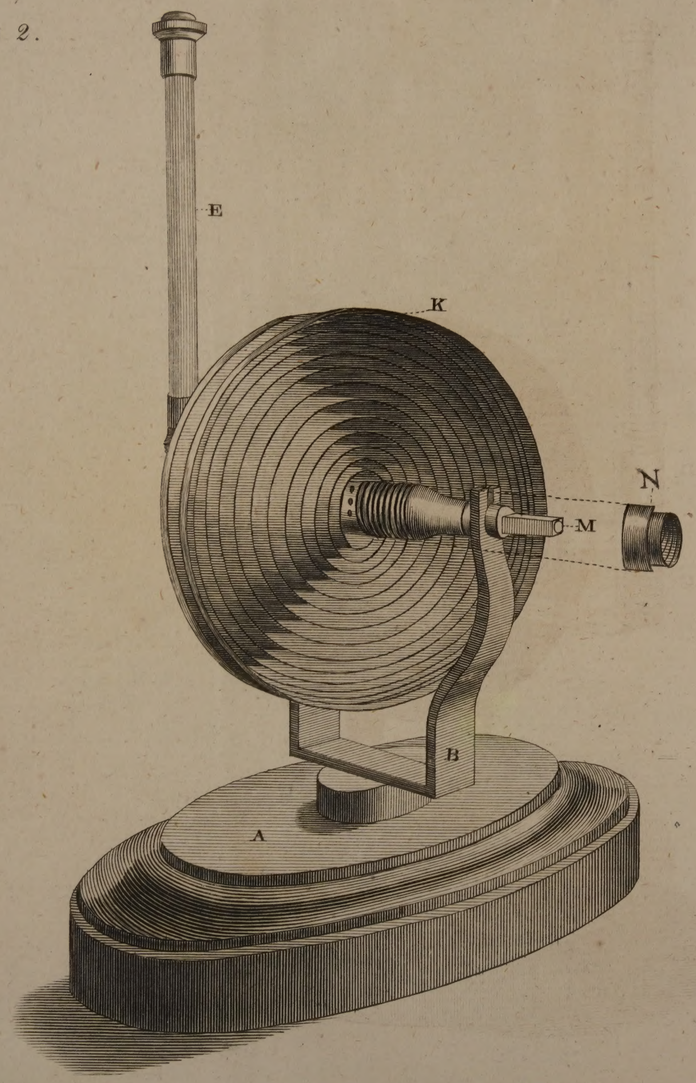
Fig 2.

Fig 1.

T. Miller sculp.

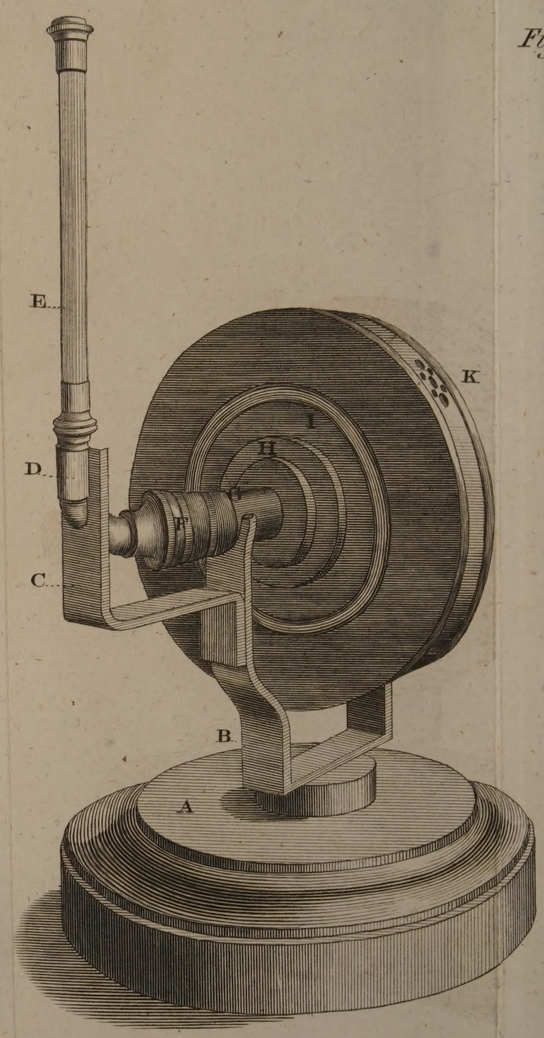
A View of the Machine laid open.

Fig 2.



A Perspective View of Mr. Wirtz Hydraulic Machine.

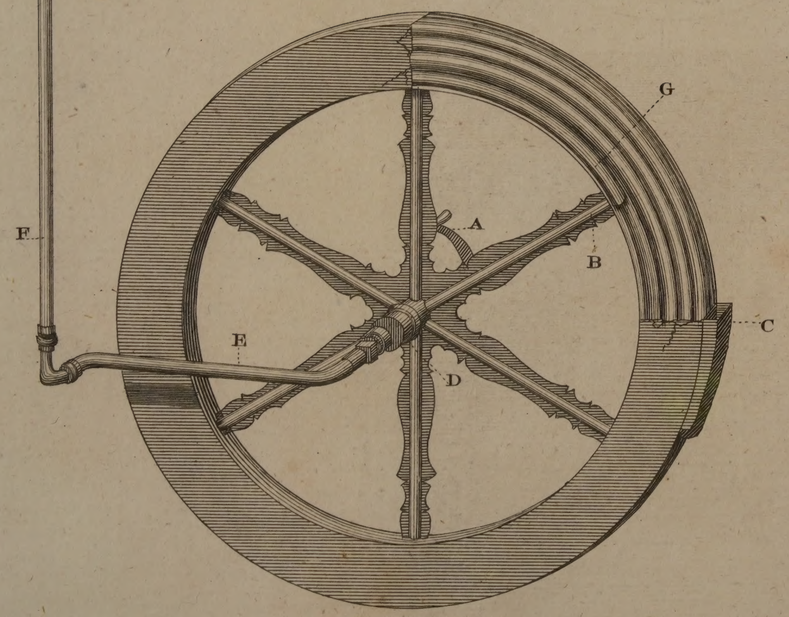
Fig 1.

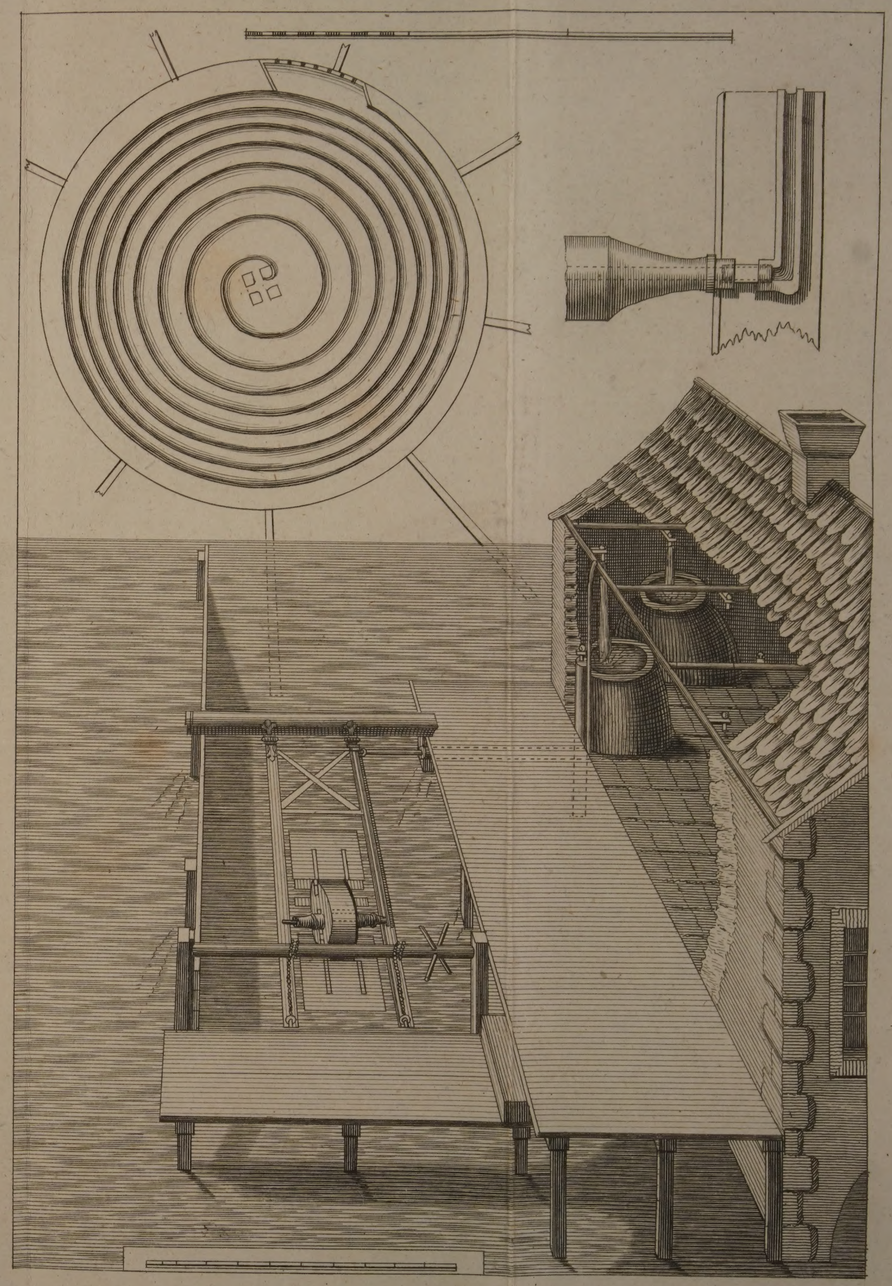


T. Miller sculp.

T. Miller sculp.

Fig 3.





T. Miller sculp.

A Perspective View of Mr. Merryman's Hydraulic Machine.

Fig 1st.

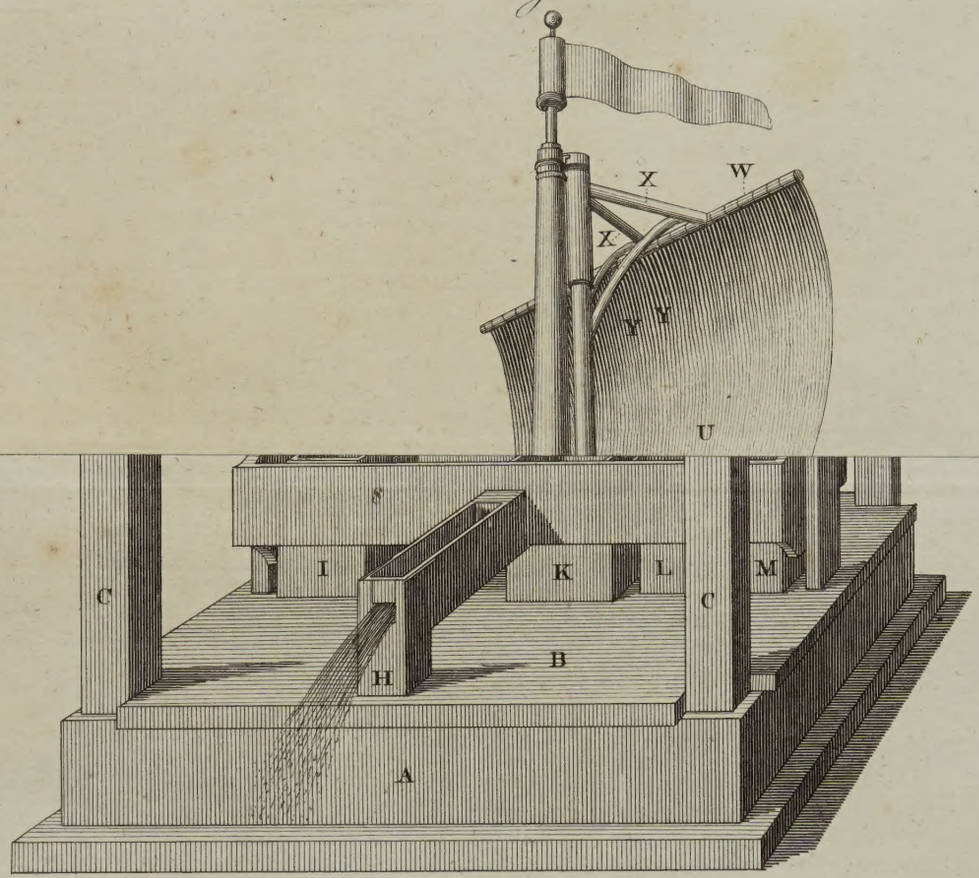
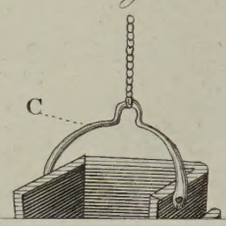


Fig. 2d.



A. M. Bailey del.

T. Miller sculp.

A Perspective View of M.r Merryman's Hydraulic Machine.

Fig. 1.st

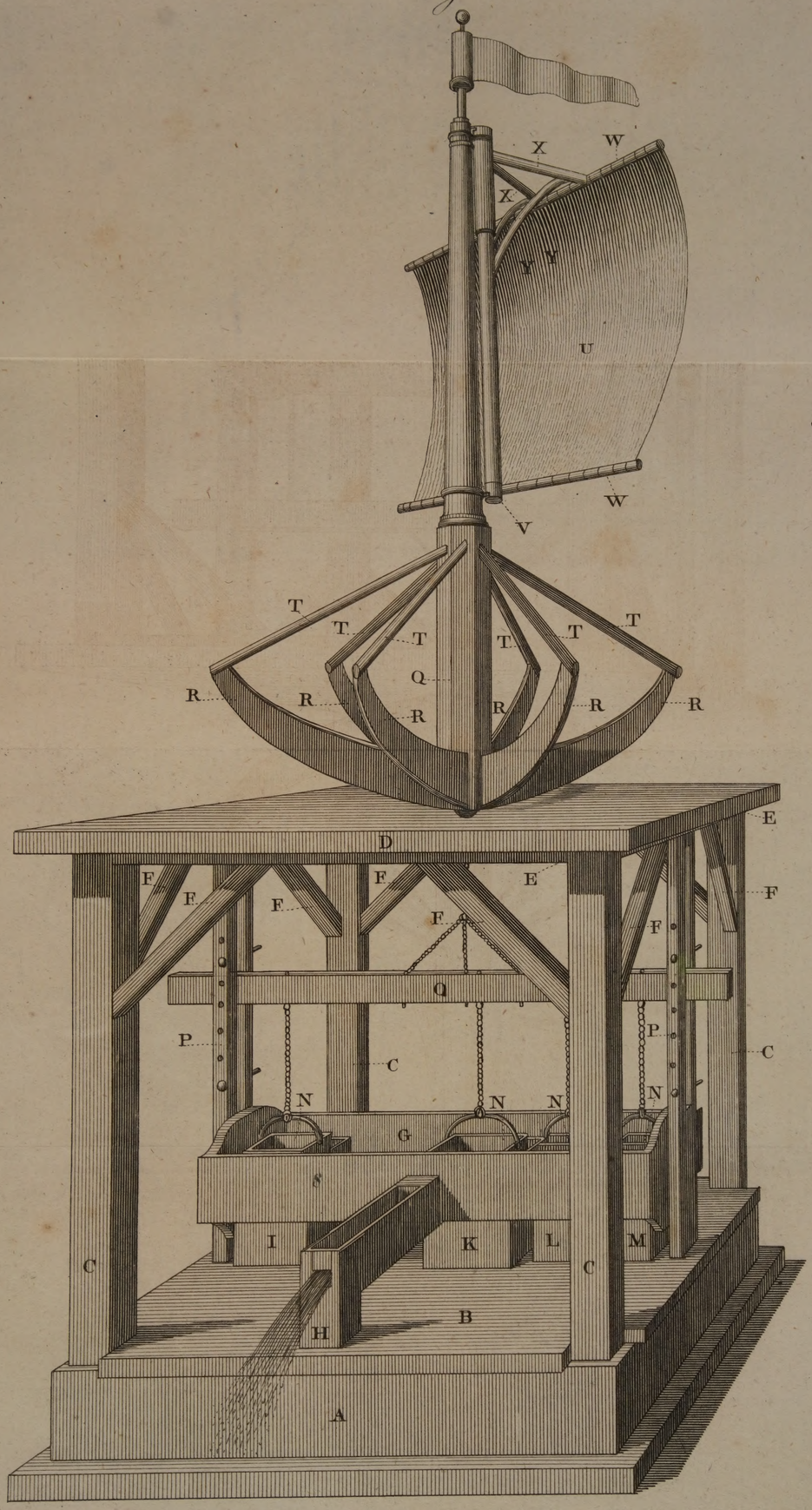
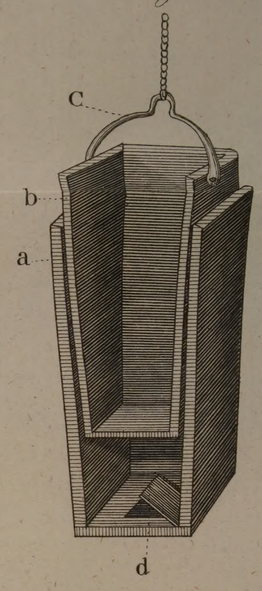


Fig. 2.d



A. M. Bailey del.

T. Miller sculp.

Alex.r Malyn Bailey del.

John Vitalba sculp.

Alex.r Madyn Bailey del.

A View of the Dutch method of fishing for Cod and Turbot.

John Vitalba sculp.

A Perspective View of Mr. Bailey's Machine for boring Auger Holes.

Plate 1. Fig 1.

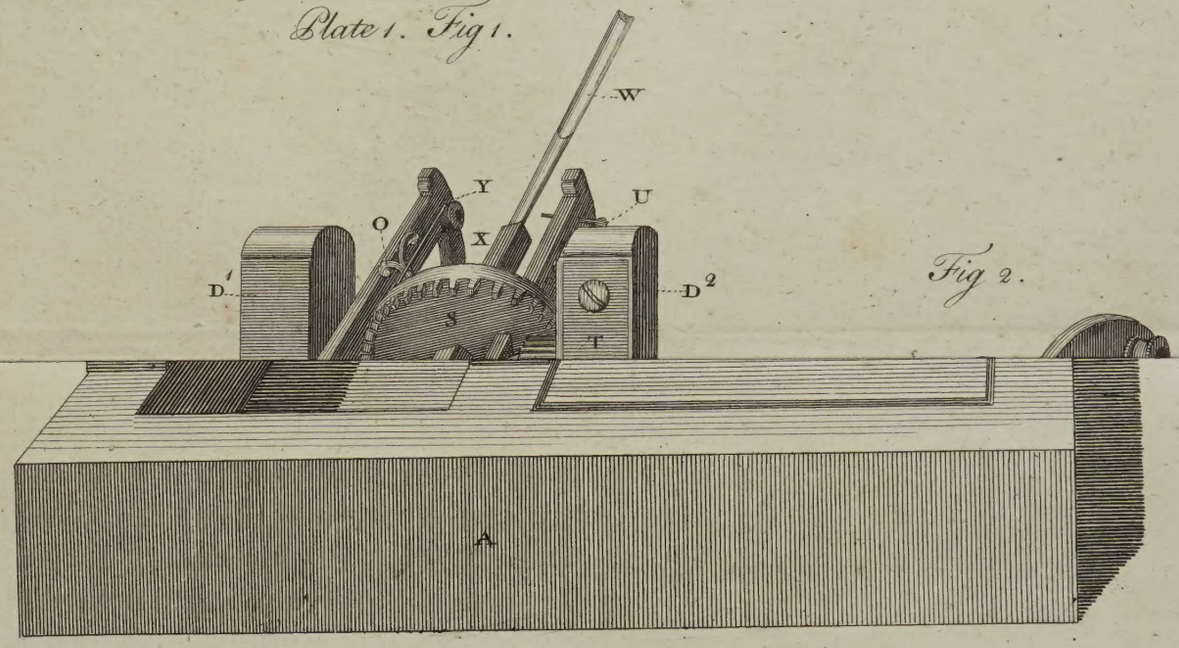
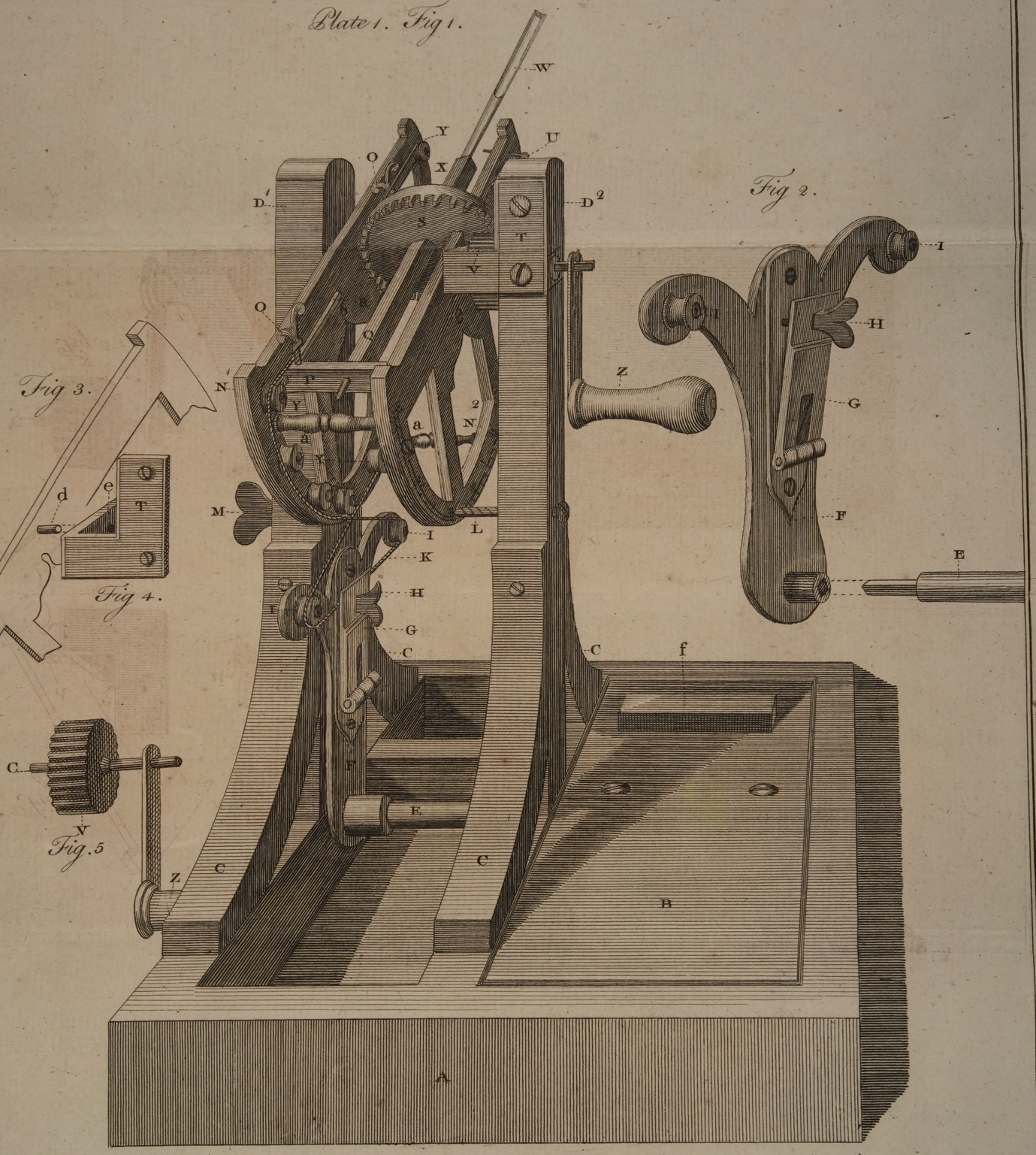


Fig 2.

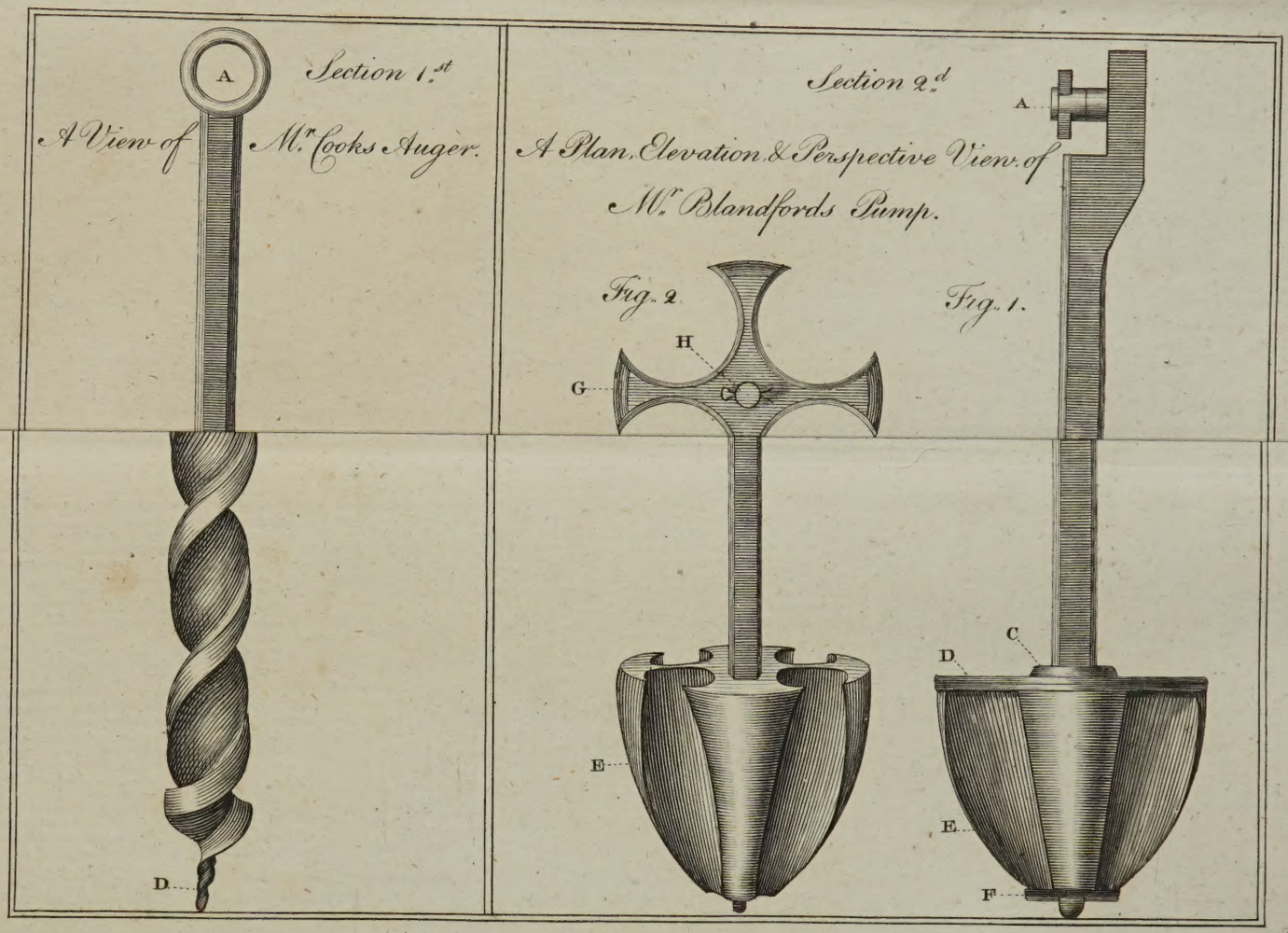
T. Miller sculp.

A Perspective View of Mr. Bailey's Machine for boring Auger Holes.

Plate 1. Fig 1.



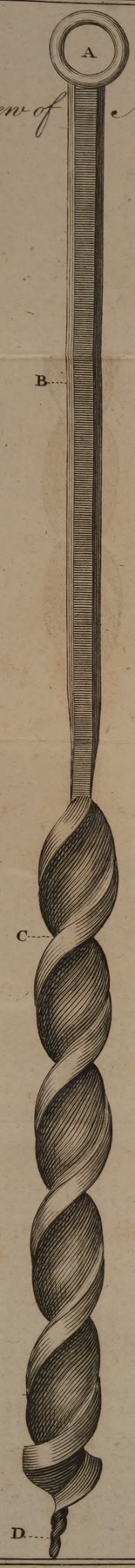
T. Miller sculp.



A. M. Bailey del.

Section 1.st

A View of M.r Cooks Auger.



Section 2.d

A Plan, Elevation & Perspective View of M.r Blandfords Pump.

Fig. 2

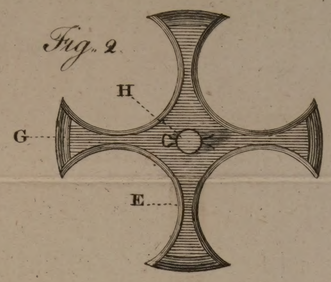
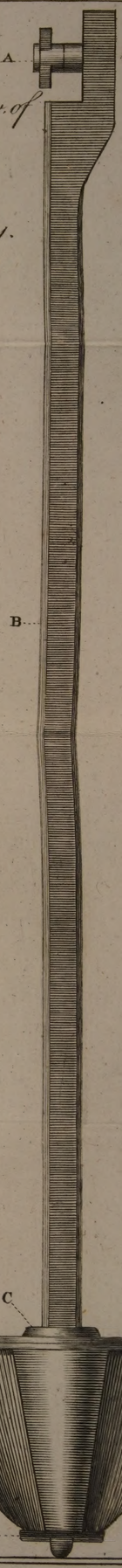


Fig. 1.



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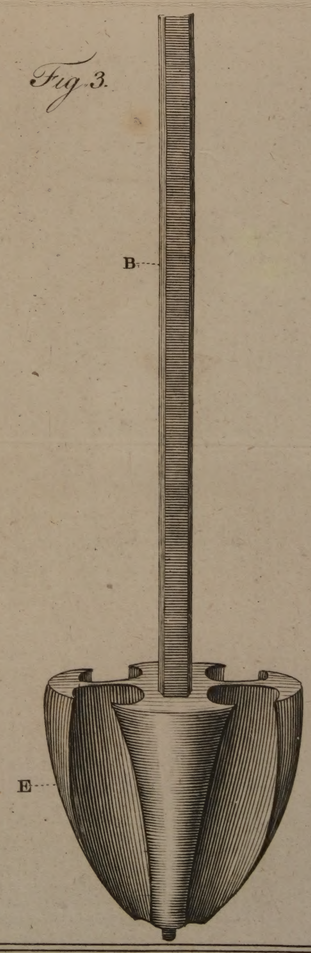
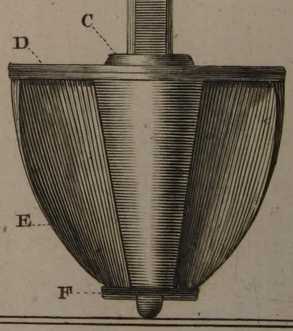
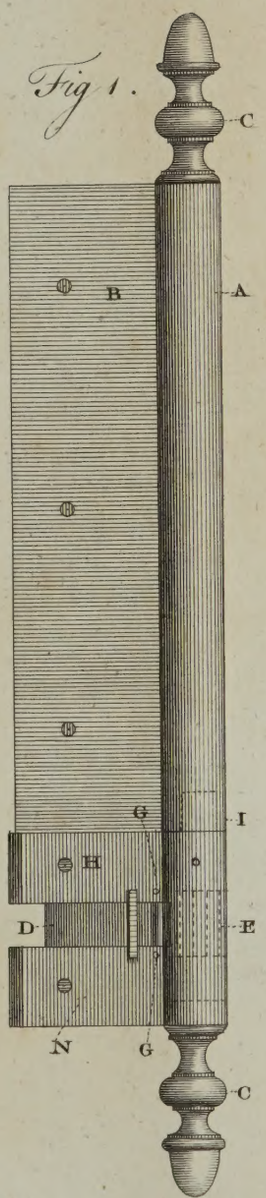




A. & M. Bailey del.

Fig 1.



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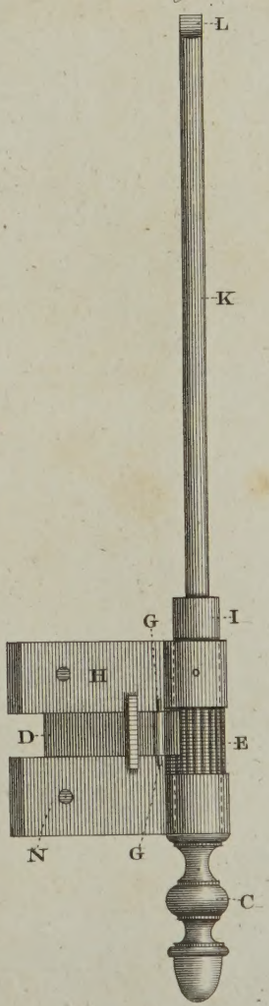
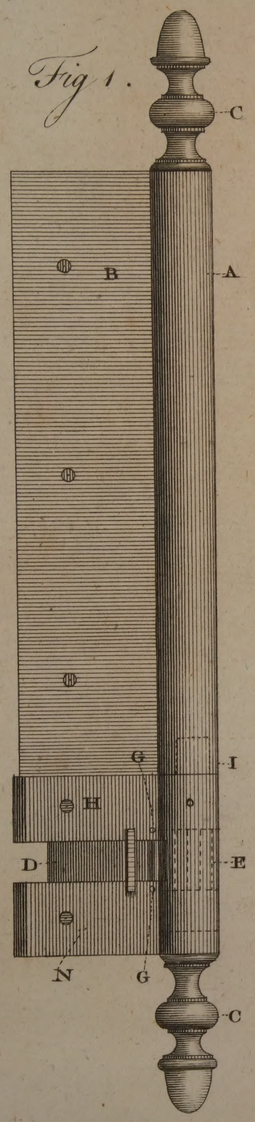


T. Miller sculp.

Fig 1. A View of Mr. Delivitz's Door-Hinge.

Fig 1.



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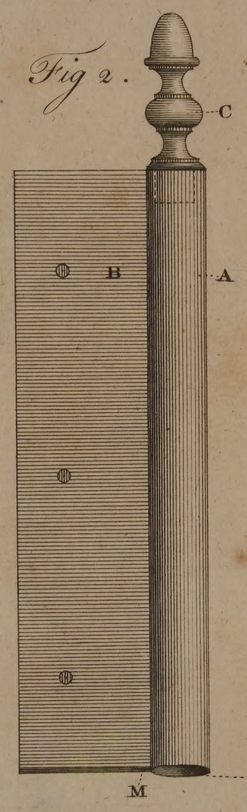

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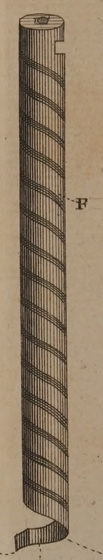
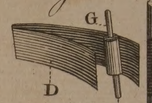


Fig 4.



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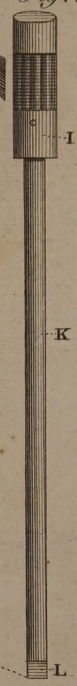

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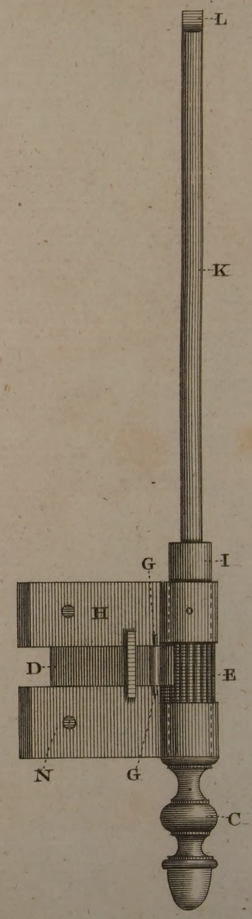
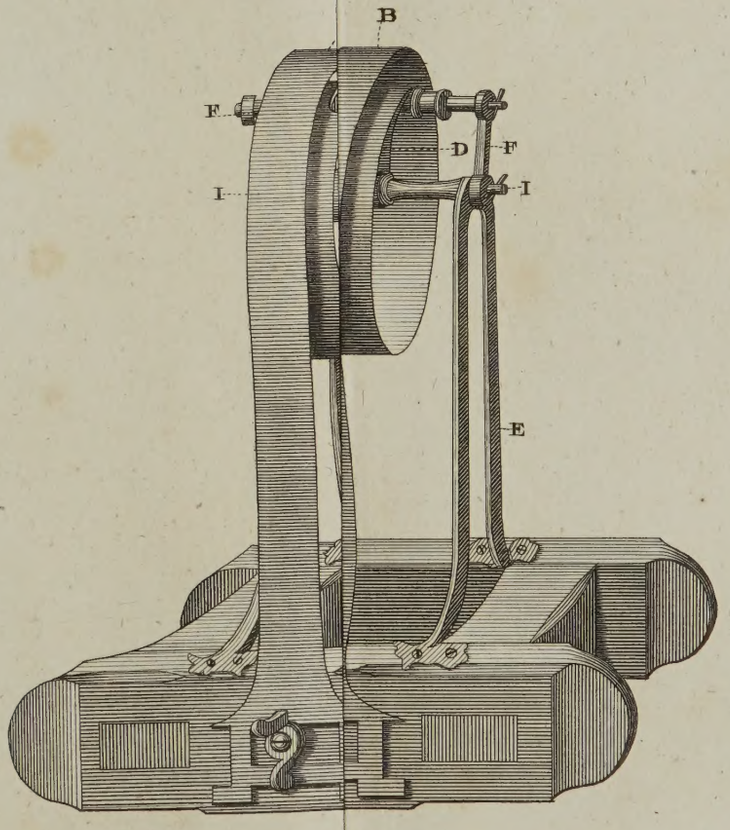


T. Miller sculp.

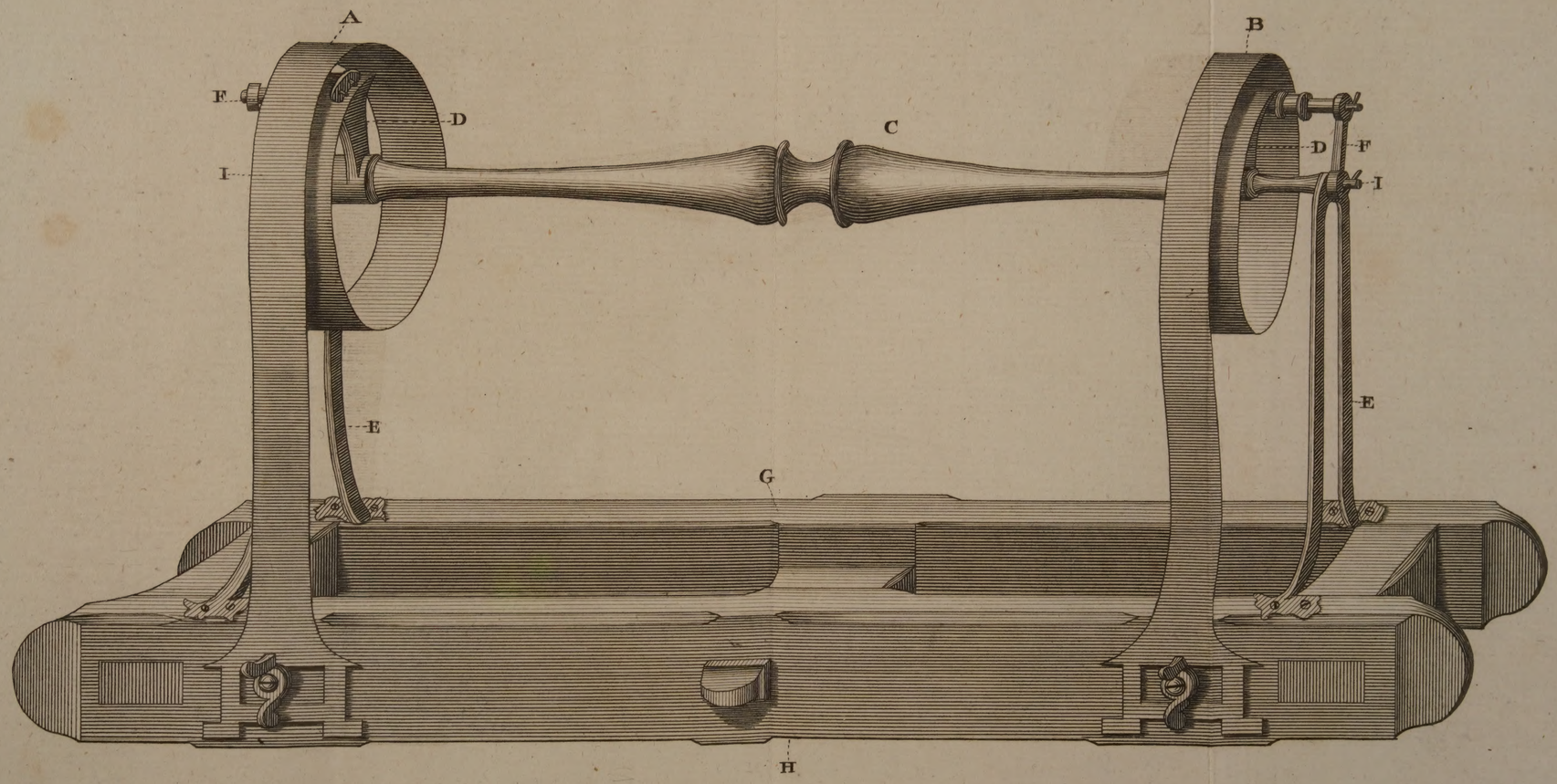


A. M. Bailey del.

T. Miller sculp.

A Perspective View of Mr. Jacob's Carriage Springs,

Calculated for the greater Ease & Safety of the Riders.



A. Mr. Bailey del.

T. Miller sculps

Front View of Mr. Staghold's Jack.

Back View of Mr. Staghold's Jack.

Fig. 1.

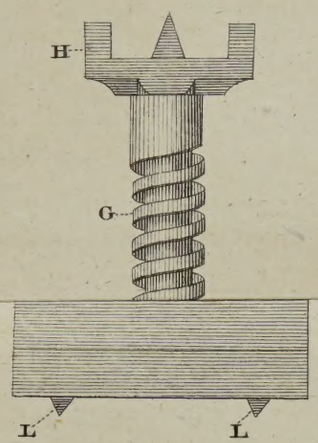
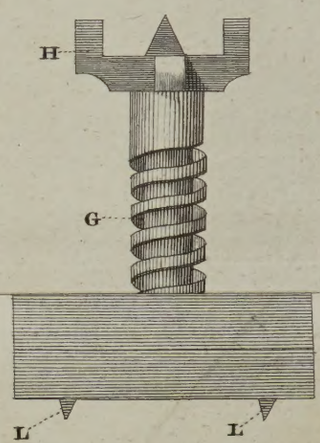


Fig. 2.



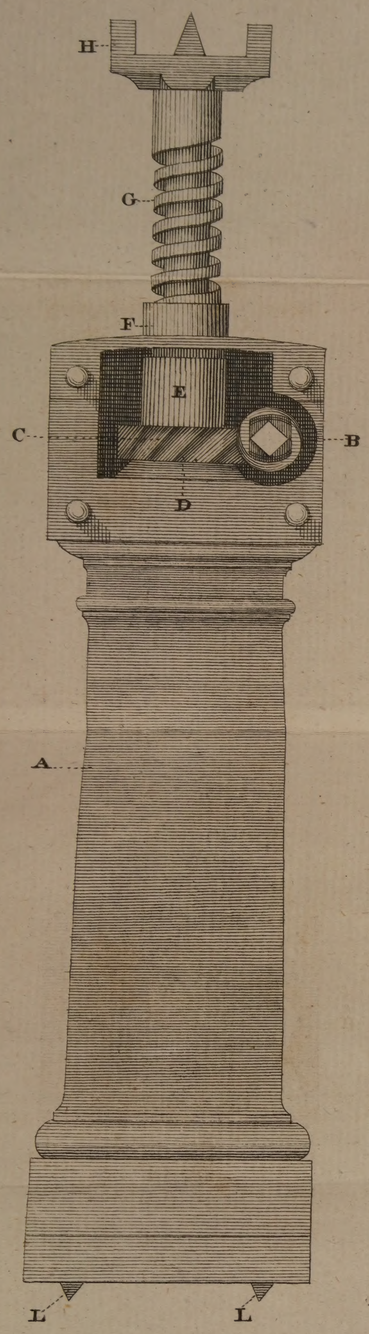
A. M. Bailey del.

J. Vitalba sculp.

Front View of Mr. Staghold's Jack.

Back View of Mr. Staghold's Jack.

Fig. 1.



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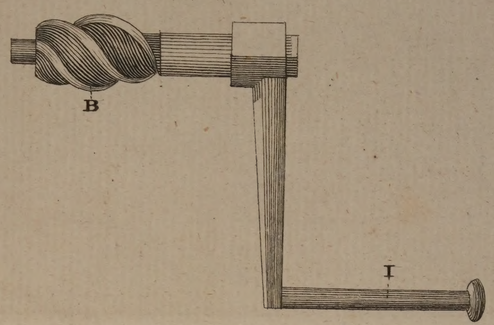
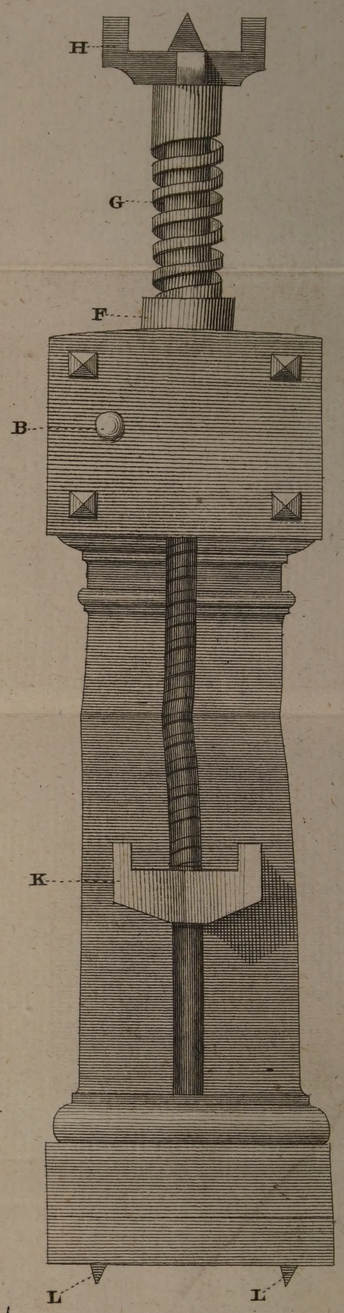


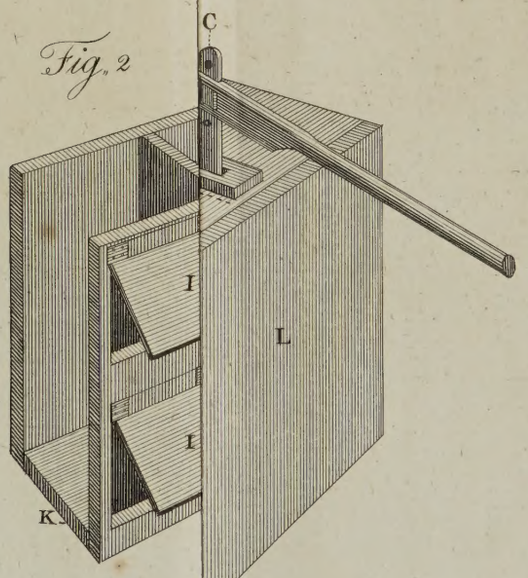
Fig. 2.



A. M. Bailey del.

F. Vitalba sculp.

Fig. 2



A.M. Bailey del.

T. Miller sculp.

Perspective View of the Rev.d D.r Hales Ventilators.

Fig. 1

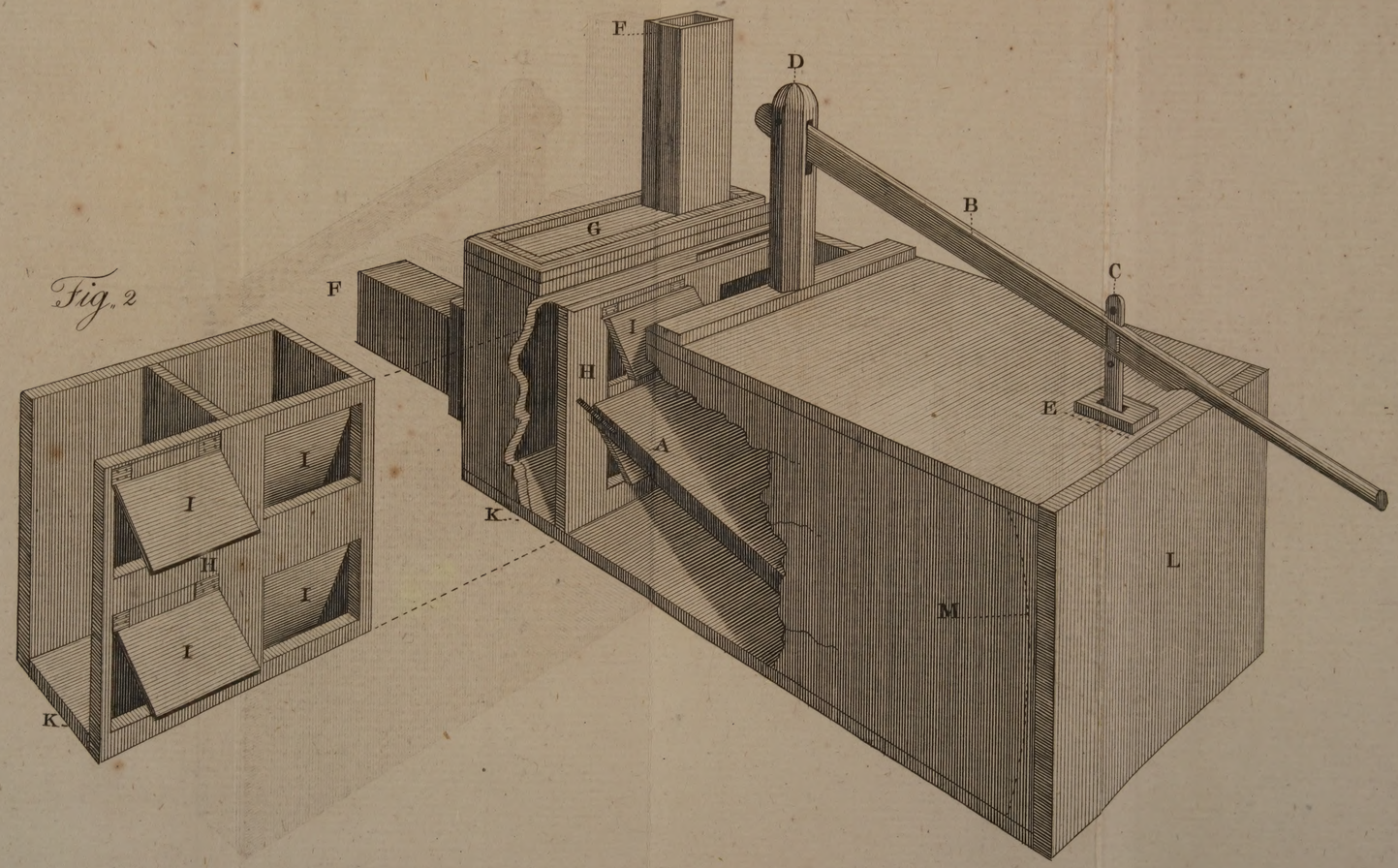


Fig. 2

A.M. Bailey del.

T. Miller sculp.

A Ms.

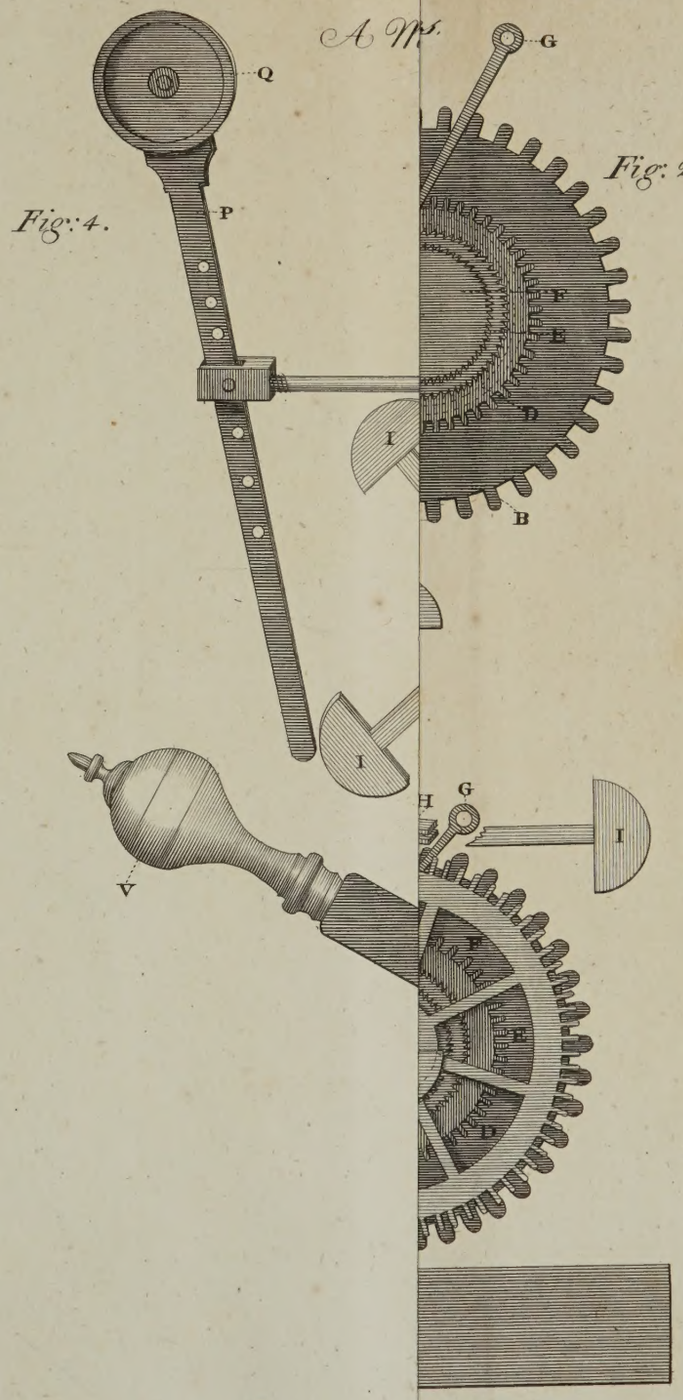


Fig: 4.

Fig: 2.

Wm. Bailey Junr. del.

T. Miller sculp.

A Machine for Ventilating Mines and many other useful purposes.

Invented by Keane Fitzgerald Esqr. F. R. S.

Plate 1.

Fig: 1.

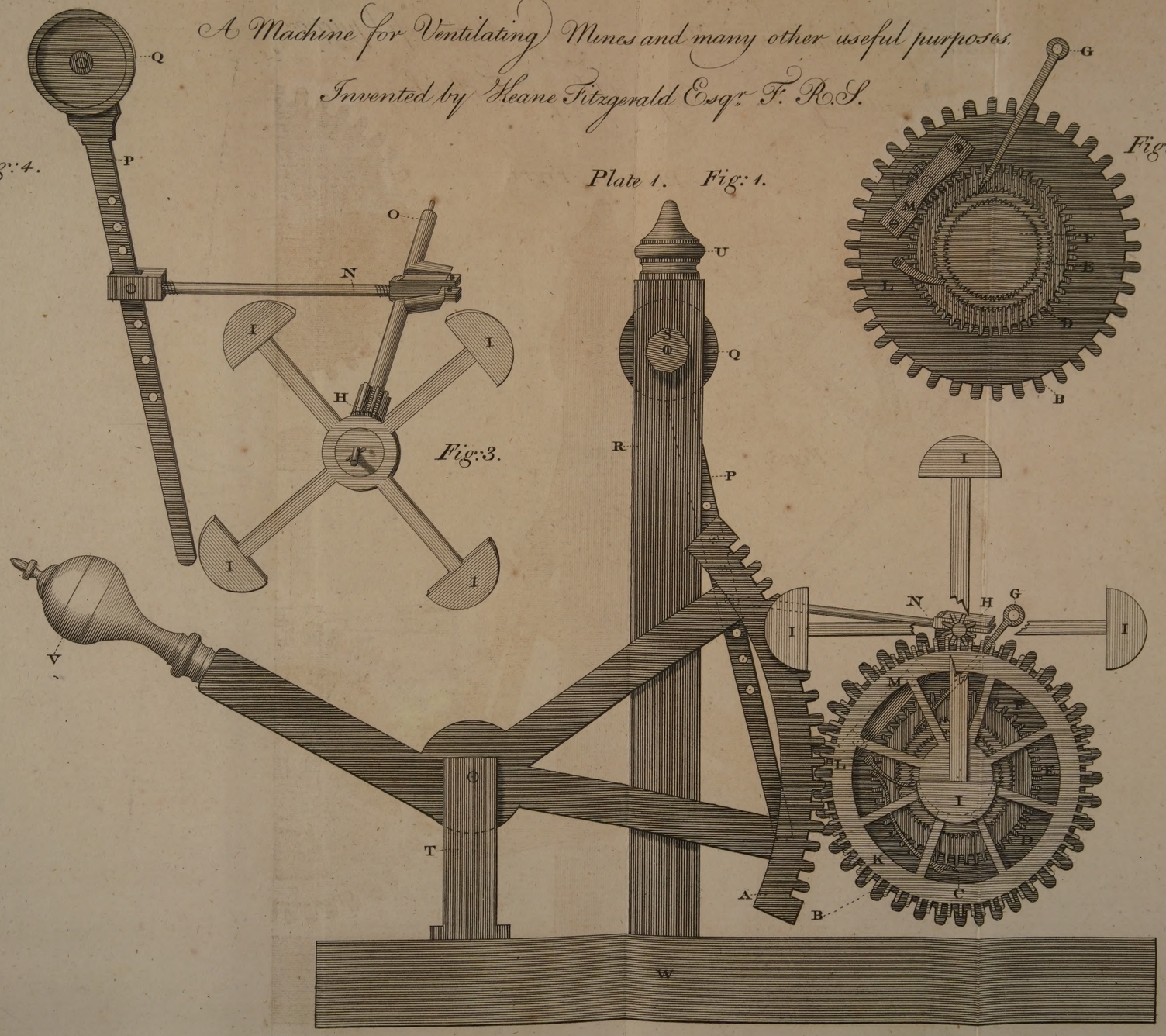


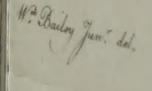
Fig: 4.

Fig: 3.

Fig: 2.

Wm. Bailey Junr. del.

T. Miller sculpt.


W.m Bailey Junr. del.

N°. LV. p 292

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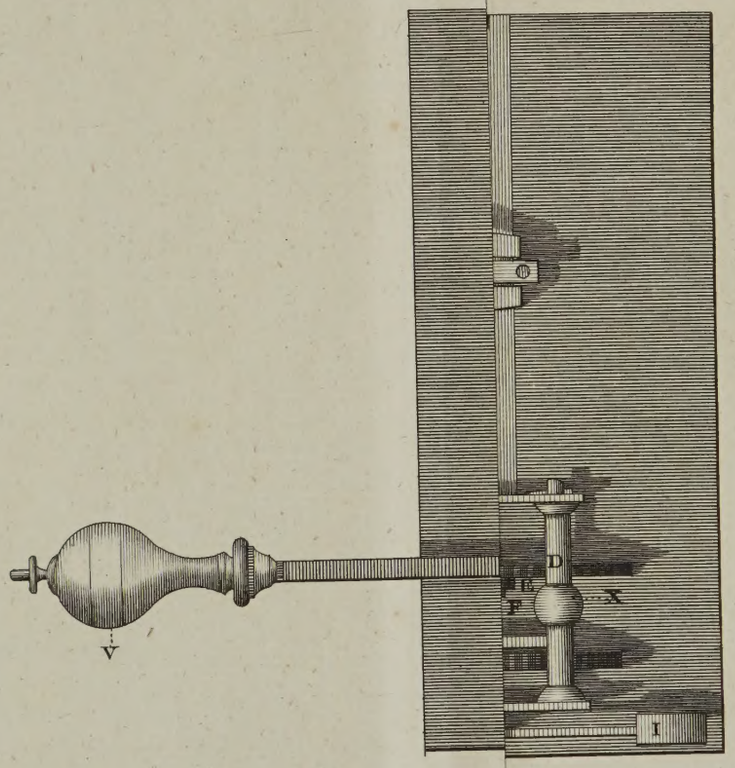
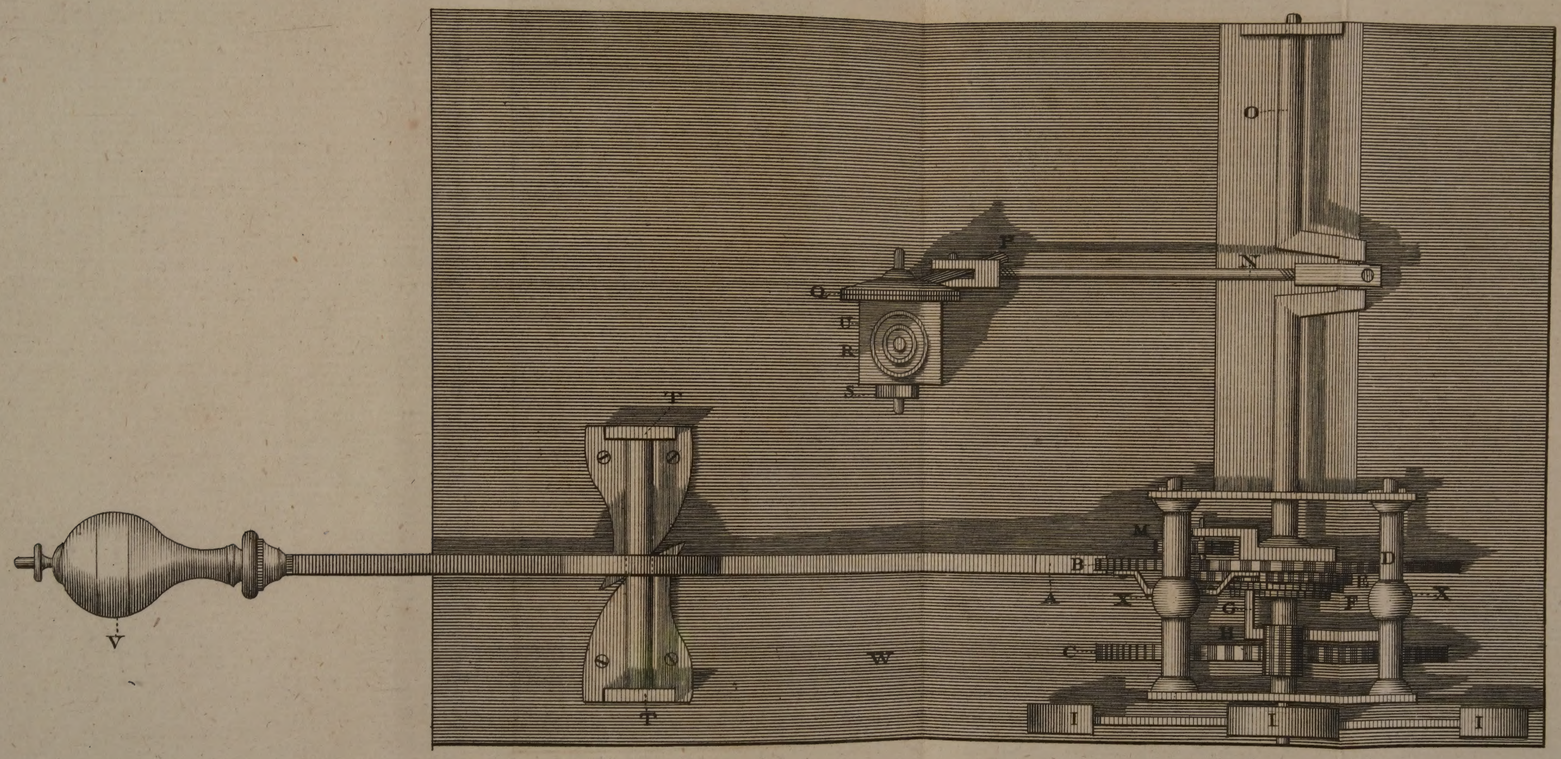


Wm Bailey Junr. del.

T. Miller sculp.

A Geometrical Plan of Mr. Fitzgerald's Machine for Ventilating Mines &c.

Plate 2. Fig: 5.



Wm Bailey Junr. del.

T. Miller sculp.